THE JOURNAL OF AGRICULTURE OF WESTERN AUSTRALIA.

COMMONWEALTH INST. OF ENTOMOLOGY LIBRARY
16 DEC 1957
Aus. 30
PARTE

2/-

VOL. 6 (Third Series) NO. 5

SEPTEMBER—OCTOBER, 1957

Registered at the G.P.O., Perth, for transmission by post as a periodical

WESFARMERS GIVE YOUR

WOOL

expert attention

"You make no mistake when you consign your wool to WESFARMERS"

Says

Mr. GILBERT SMITH

Wesfarmers Chief Wool Valuer

The new Wool Store at South Fremantle provides ideal space and light for the display and storage of wool

If you're in the Wool Business — then its Good Business to consign to

Wesfarmers

The JOURNAL OF THE DEPARTMENT OF AGRICULTURE
WESTERN AUSTRALIA

VOL. 6 (Third Series) SEPTEMBER – OCTOBER, 1957 No. 5

Published every second month by the Department of Agriculture, St. George's Terrace, Perth

The subscription rate (which includes postage) is 10s. per annum. Single copies 2s. each.

Edited by
J. A. MALLETT

Articles which appear in the "Journal" may be reprinted, provided that the "Journal" and the authors are acknowledged.

Issued by direction of THE MINISTER FOR AGRICULTURE.

COVER PICTURE

Kangaroo paws and many other attractive wildflowers add to the springtime beauty of the Forrest National Park

IN THIS ISSUE

	Page
The Control of Weeds in Lawns .... G. A. Pearce	505
Fat Lamb Production in Western Australia—Part 2 N. Davenport	515
Hypocalcaemia in Breeding Ewes .... C. R. Toop	525
The San Jose Scale .... C. F. H. Jenkins	529
Bindweed .... G. R. W. Meadly	533
Wheat and Barley Trials, 1956-57 F. L. Shier and J. T. Reeves	537
Calf-hood Scours .... P. M. A. Harwood	543
Oat Trials and Usage in the Wheatbelt, 1956 A. S. Wild and J. T. Reeves	551
Weight Trends in Fattening Cattle (Continued) .... M. Cullity	565
Farm and Home—Some Popular Puddings Margaret Spencer	579
Preparing Cattle for Shows .... T. Parker	585
Australian Tractor Tests—The McCormick International Super AW-6 (Kerosene)	587
Broom Millet .... F. E. Ryan	593
Rearing Orphan Piglets .... A. W. Williams	597
Oats and Vetches Show Their Worth at Bridgetown A. W. Hobbs	599
Organised Vermin Control .... A. R. Tomlinson	601
Book Review—Sheep Shearing Experting .... M. Butler	603
Cut or Graze Your Fodder Crops Early .... L. C. Snook	605
Fertiliser Trials With Potatoes at Manjimup .... T. Wachtel	607
Pullorum-Tested Poultry Flocks	613
A Sheep Dipping Problem	614
Vibriosis in Cattle .... P. M. A. Harwood	615
Books for Farmers	617
Spring Sown Oats for Hay F. E. Ryan, V. Weston and A. S. James	619
Sensational Apple Yields .... J. S. Bloomfield	621
Fodder Conservation Brings Bigger Cream Cheques J. A. Carberry	625

By Authority: WILLIAM H. WYATT, Government Printer, Perth

7261/8/57—15,750

THE DEPARTMENT OF AGRICULTURE
of
WESTERN AUSTRALIA

Minister for Lands and Agriculture:
THE HON. E. K. HOAR, M.L.A.

Director of Agriculture:
G. K. BARON HAY.

Deputy Director of Agriculture:
T. C. DUNNE.

Chief Administrative Officer:
W. HOPKINSON.

Controller of Abattoirs.—T. C. ROWLANDS.
Rural Economic Adviser.—R. P. ROBERTS.
Chief Clerk.—A. W. R. HUME.
Editor, "Journal of Agriculture."—J. A. MALLETT.
Librarian.—Miss A. E. M. WHITE.

ANIMAL DIVISION

Chief Veterinary Surgeon and Chief Inspector of Stock.—C. R. TOOP.
Assistant Chief Veterinary Surgeon.—E. F. TWADDLE.
Veterinary Surgeons.—J. SHILKIN; J. CRAIG; P. M. A. HARWOOD; F. C. WILKINSON (Head Office); R. HARLEY; A. M. SIER (Bunbury); A. W. WILLIAMS (Geraldton); P. B. LEWIS (Manjimup).
Senior Stock Inspector.—J. F. ROBINSON.
Stock Inspectors.—S. COOK; B. D. HOOPER; A. C. LINTO; J. MITCHELL (Head Office); J. R. BLACKBURN; R. J. CARROLL (Bridgetown); C. R. DIXON (Bunbury); T. INGATE (Derby); E. S. M. SMITH (Geraldton); E. G. McKENZIE (Kalgoorlie); B. EVANS (Kellerberrin); A. E. AITKEN (Midland Junction); D. G. STRANG (Moora); C. V. HADLEY; A. L. RIPPER (Albany); N. W. FROOME (Narrogin); R. GREENE (Walla); C. W. TOBIN (Katanning).

ANIMAL HEALTH AND NUTRITION LABORATORIES

Principal.—H. W. BENNETTS.
Animal Nutrition Officer.—L. C. SNOOK.
Assistant Animal Nutrition Officer.—P. D. RAMM.
Veterinary Pathologists.—J. M. ARMSTRONG; D. S. ROBERTS.
Biochemist.—M. C. NOTTLE.
Research Station Manager.—N. A. SCOTT (Bramley).

POULTRY

Officer-in-Charge.—R. H. MORRIS.
Advisers.—L. J. GAFFNEY; P. SMETANA.
Instructors.—A. R. WRIGHT; R. VAGG.
Inspectors.—W. WARD; J. A. HOY; M. V. G. CRITCHELL.
Research Station Manager.—W. G. HEWITT.
Technician.—D. F. HESSELS.

BRANDS

Registrar of Brands.—C. R. TOOP.

HORTICULTURAL DIVISION

Superintendent of Horticulture.—H. R. POWELL.
Assistant Superintendent of Horticulture.—J. P. ECKERSLEY.

FRUIT

Senior Adviser.—F. MELVILLE.
Viticulturist.—W. R. JAMIESON.
Advisers.—S. E. HARDISTY (Bridgetown); K. T. WHITELY (Albany); J. CRIPPS; N. SHORTER (Head Office).
Senior Instructor.—T. F. HERLIHY.
Senior Packing Instructor.—J. S. BLOOMFIELD.
Assistant Packing Instructor.—A. B. THOMAS.
Instructors.—W. CAMPBELL (Albany); R. G. CAHILL; A. BRIMSON (Bridgetown); J. C. ROWBOTHAM (Bunbury); E. L. NEAVE (Kalamunda); H. ARGYLE (Gosnells); W. J. RENNICK (Manjimup); L. G. HAYWARD (Mundaring); A. O. WELLS (Head Office); R. RODDA (Midland Junction).
Assistant Instructor.—N. GROWDEN (Head Office).
Senior Fruit Fly Inspector.—E. H. ELKINGTON.
Fruit Fly Inspectors.—F. LOVE; F. JACKSON; R. WILKINSON; A. SIBSON; K. LANKASTER; H. J. YELVERTON (Metropolitan); S. WILLIAMS (Bunbury); M. EVANS (Chittering); N. BROCKMAN (Donnybrook); I. RENNIE (Harvey); J. L. LITTLELY (Mundaring); G. DIGNEY (Pinjarra); J. W. ROLINSON (Swan); J. HART (Kelmscott); R. E. JACKSON (Kalamunda).
Research Station Managers.—T. C. WILSON (Upper Swan); W. G. LOCKWOOD (Stoneville).

VEGETABLES

Senior Adviser.—J. P. FALLON.
Advisers.—D. A. W. JOHNSTON; T. WACHTEL.
Instructors.—M. HARDIE (Head Office); W. KOOYMAN (Head Office); J. NAJMAN (Albany); G. C. De HAAN (Manjimup); H. LEITCH (Bunbury); F. HERBERT (Geraldton).
Research Station Manager.—R. BELL (Wembley).

TOBACCO

Adviser.—A. E. BAKER (Manjimup).
Instructor.—R. KLANJSCEK (Manjimup).
Research Station Manager.—H. G. MORTLOCK (Manjimup).
Technician.—R. PEARSE.

APICULTURE

Officer-in-Charge.—R. S. COLEMAN.
Technicians.—A. C. KESSELL; S. R. CHAMBERS.

INSPECTION SERVICES

Senior Inspector.—A. T. GULVIN.
Inspectors—(Fruit).—J. F. S. MAUNSELL; J. SLAMON; W. J. PHARAZYN; E. FULLER (Fremantle); E. H. RAWSON; W. WEAR (Metropolitan Markets); F. HERBERT (Geraldton); W. WARDELL-JOHNSON (Kalgoorlie).
Inspectors—(Vegetables).—F. H. TONKIN; J. STEELE (Metropolitan).

DAIRYING DIVISION

Superintendent of Dairying.—M. CULLITY.
Assistant Superintendent.—H. G. ELLIOTT.
Agrostologist.—F. E. RYAN.
Dairy Cattle and Pig Husbandry Officer.—K. NEEDHAM.
Advisers.—K. M. HOPE (Head Office); B. WILLIAMS (Bunbury); R. A. BETTENAY (Busselton); A. W. HOBBS (Bridgetown); F. BRIDGMAN (Wokalup Research Station); J. A. CARBERRY (Denmark); N. McNEILL (Waroona); R. SPRIVULIS (Manjimup).
Officer-in-Charge, Dairy Factory and Produce Inspection.—H. M. LISTER.
Dairy Produce Inspector—A. H. HOBBS.
Instructors.—N. INGLETON, G. W. R. SCOTT, H. J. WEST (Head Office); D. C. MICKLE, B. ARNEY (Bunbury); H. MASLIN (Capel); J. T. McNALLY (Manjimup); A. L. HAMILTON (Busselton).
Pure Bred Herd Recorders.—J. A. DARRAGH; G. D. BASTYAN.
Research Station Managers.—K. W. SIMES (Wokalup); V. WESTON (Denmark).
Technician.—A. S. JAMES.
Junior Technicians.—R. CAMPBELL (Bridgetown); S. R. DUNSTAN (Wokalup Research Station).
Field Assistants.—P. C. BECK (Head Office); D. W. HOME (Busselton).

WHEAT AND SHEEP DIVISION

Superintendent of Wheat Farming.—F. L. SHIER.

Assistant Superintendent.—A. S. WILD.

WHEAT AND SHEEP

Senior Adviser Meat Production.—N. DAVENPORT.

Regional Advisers.—H. G. CARISS (Head Office); G. L. THROSSELL (Geraldton).

Plant Geneticist.—J. T. REEVES.

Advisers.—H. M. FISHER, W. P. CULLINANE, J. A. PARISH (Head Office); L. J. DOYLE (Geraldton); B. F. CARLIN, J. A. C. SMITH (Moora); L. D. WHITE, D. B. ARGYLE (Northam); T. E. McDOWELL (Narrogin); G. T. HALPIN (Katanning); A. F. SMITH (Mt. Barker); G. R. GREWAR (Esperance).

Instructor.—J. W. GILCHRIST (Geraldton).

Research Station Managers.—S. D. T. BYRNE (Chapman); R. L. DOWN (Avondale); F. C. F. GISHUBL (Merredin); E. B. NORRIS (Esperance Plain and Salmon Gums).

Technicians.—F. W. NEWMAN (Wongan Hills); R. K. GOULDER (Head Office).

SHEEP AND WOOL

Officer-in-Charge.—W. L. McGARRY.

Advisers.—I. K. STOTT; C. J. SPENCER (Narrogin).

Sheep and Wool Instructors.—J. REILLY; M. BUTLER.

Shearing Instructor.—D. YOUNG.

SEED CERTIFICATION AND WEEDS

Officer-in-Charge.—G. R. W. MEADLY.

Botanists.—B. J. QUINLIVAN; G. A. PEARCE; T. E. H. APLIN.

Weed Control Officers.—K. RYAN (Head Office); J. N. HUTCHINSON (Bunbury); E. G. McKENZIE (Kalgoorlie); W. H. JOHNSON (Albany); C. V. CAHILL (Northam); I. D. LYON (Head Office); H. A. PEARCE (Moora); P. W. DRAPER (Narrogin).

SOILS DIVISION

Superintendent of Soils Division and Commissioner of Soil Conservation.—L. C. LIGHTFOOT.

Senior Soil Research Officer.—S. T. SMITH.

Advisers.—G. W. SPENCER, B. a'B. MARSH, T. C. STONEMAN, C. V. MALCOLM (Head Office); J. E. WATSON, J. C. GRASBY (Northam); D. J. CARDER (Narrogin); J. L. McMULLAN (Geraldton).

Clearing Control Inspector.—W. BRYAN.

Technicians.—K. WISE (Northam); G. R. DAVIES (Narrogin).

Field Assistant.—J. F. E. PALANDRI.

IRRIGATION

Officer-in-Charge.—H. J. K. GIBSONE.

Assistant Officer-in-Charge.—G. GAUNTLETT.

Advisers.—J. LEWIS (Bunbury); B. SWAN (Harvey); J. LANGDON (Harvey).

Technicians.—G. C. BROWN, A. B. MORRISON (Bunbury); A. H. BOSCH (Waroona); G. J. FINN (Kimberley Research Station).

RESEARCH DIVISION

Chief Plant Research Officer.—G. H. BURVILL.

Senior Plant Research Officer.—L. T. JONES.

Research Officers.—E. N. FITZPATRICK; N. J. HALSE; J. TOMS; C. R. HALE; L. W. PYM; P. STALLWOOD.

Technicians.—N. W. O'GARR; J. WALLIS.

MURESK AGRICULTURAL COLLEGE

Principal.—W. SOUTHERN.

Assistant Principal and Senior Lecturer.—A. J. T MARSHALL.

Science Lecturer.—A. H. WALKINGTON.

Lecturer, House and Sports Master.—C. B. TILBROOK.

Junior Lecturer.—M. J. GRANDISON.

Farm Manager and Demonstrator.—D. R. BATEMAN.

Dairy Instructor.—J. F. BRENNAN.

Piggery Instructor.—P. GARSTONE.

Poultry Instructor.—A. M. GARDINER.

Horticultural Instructor.—R. A. HILL.

Sheep Instructor.—H. P. DWYER.

Farm Engineering Instructor.—J. BRISTOW STAGG.

Building Instructor.—K. HICKS.

MISCELLANEOUS BRANCHES

BOTANICAL BRANCH

Government Botanist and Curator of State Herbarium.—C. A. GARDNER.

Senior Botanist.—R. D. ROYCE.

Assistant Botanist.—J. W. GREEN.

Herbarium Assistant.—N. G. MARCHANT.

PLANT PATHOLOGY BRANCH

Government Plant Pathologist.—W. P. CASS SMITH.

Senior Plant Pathologist.—H. L. HARVEY.

Plant Pathologists.—Miss O. M. GOSS; R. F. DOEPEL; A. A. HOLLAND; S. C. CHAMBERS.

Field Technician.—W. PICKERING.

ENTOMOLOGY BRANCH

Government Entomologist.—C. F. H. JENKINS.

Senior Entomologist.—P. N. FORTE.

Entomologists.—D. G. SHEDLEY; J. A. BUTTON; L. E. KOCH; G. D. RIMES; K. T. RICHARDS; Miss C. A. PILTER.

VERMIN CONTROL BRANCH

Chief Vermin Control Officer.—A. R. TOMLINSON.

Assistant Chief Vermin Control Officer.—J. S. CRAWFORD.

Senior Vermin Control Officer.—C. J. MARSHALL.

Supervising Vermin Control Officer.—A. G. VEITCH.

Research Officer.—C. D. GOODING.

Research Technicians.—J. L. LONG; W. DE JONG (Wiluna); L. A. HARRISON.

Warren Ripping Supervisor.—J. A. DAVIES.

Vermin Fence Inspectors.—A. H. WARREN (Burracoppin); R. CORNEY (Yalgoo).

Rabbit Control Supervisor.—J. W. LEIGHTON.

Regional Vermin Control Officers.—H. HART (Northern Agricultural Areas); W. H. TESTER (Lower Great Southern); C. J. WOODBURY (Central Great Southern); S. M. HARVEY (South-West); T. J. TOZER (Eastern Wheatbelt); J. C. McSWAIN (Coastal Areas); S. D. KEYSER (Central); A. G. LYMON (Upper Great Southern); L. C. McCRACKEN (Midlands).

Vermin Control Officers.—G. V. CROOKE (Pinjarra); S. J. HARPER (Mingenew); D. J. KING (Bridgetown); H. A. PEDRETTI (Carnamah); J. C. SMITH (Mt. Barker); L. E. SHIELDS (Williams); A. C. CARTER (Geraldton); R. F. KILGALLIN (Southern Cross); F. G. VAGG (Nungarin); J. P. O'MEARA (Toodyay); N. L. DAVIES (Brookton); G. BICKNELL (Katanning); R. H. GREEN (Swan); G. F. STEER (Dumbleyung); C. E. HOUSE (Boyanup); P. W. DARGIE (Carnamah); G. MORGAN (Balingup); C. MEREDITH (Narrogin); R. G. LEE.

Supervising Vermin Control Officer (Wild Dogs).—C. K. BLAIR.

Regional Vermin Control Officers (Wild Dogs).—S. J. MOORE (Southern Areas); R. J. FRASER, C. A. CARLISLE (North-West); P. J. McDONALD (Kimberleys); A. J. CARLISLE (Eastern Goldfields).

NORTH-WEST BRANCH

Officer-in-Charge.—W. M. NUNN.

Regional Adviser (Carnarvon).—H. SUIJDENDORP.

Agricultural Advisers.—J. B. RITSON (Kimberley Research Station); K. FITZGERALD (Kimberley Research Station); D. G. WILCOX (Wiluna); J. A. LAWSON (Carnarvon); R. A. REES (Carnarvon).

Cattle Adviser.—G. A. SMITH (Broome).

Research Station Managers.—R. C. NAILARD (Gascoyne); R. D. SHERLOCK (Abydos).

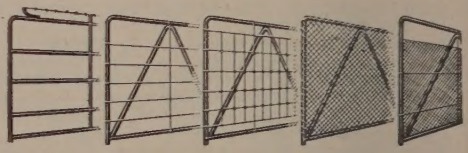
Technicians.—B. VANDER LOOS (Wiluna); R. H. COLLETT (Abydos); J. B. BROUN (Kimberley).

The finest gate you can buy—

Cyclone

'RED-TAG' QUALITY IS UNBEATEN!

"Cyclone" Red Tag gates — first in the field for smooth-swinging durability and rugged strength, are 100 per cent. stock-proof — always! Of heavy steel tubing, electrically welded, "Cyclone" Red Tag gates swing smoothly, swing level, because the heavy top and bottom hinges bolt **right through the post!**



THERE'S A "CYCLONE" RED TAG GATE FOR EVERY PURPOSE!

Whatever your need, "Cyclone" has the Red Tag gate to suit . . . Ringlock, Chain-wire, Cabled, Wire Netting, Barred . . . and a full range of sizes.

EVERYTHING IN TUBULAR STEEL OR WIRE FOR THE MAN ON THE LAND

"Cyclone" supplies everything in steel and wire for farms throughout Australia, from "Cyclone" milking bails, sheepyard panels, shearing sheds to stock transport frames, feeders and sleeping stretchers. All are strongly built, time-saving, hygienic, economical — all are designed to last a lifetime and need practically no maintenance.

Write, call or phone for full information

EVERY DAY IN SO MANY WAYS **Cyclone** SERVES AUSTRALIA

CYCLONE COMPANY OF AUSTRALIA LIMITED

Cnr. Brown and Lime Sts., East Perth. Phone BF 1454

and at Melbourne, Sydney, Adelaide, Brisbane, Townsville

C75/32

The Control of Weeds in Lawns

Fig. 1.—Although clovers are often desirable in playing fields, their presence in a household lawn, unless evenly distributed, is unsightly

By G. A. PEARCE, B.Sc. (Agric.), Botanist, Weeds and Seeds Branch

DURING the summer, a fast-growing lawn with a deep green colour can usually be produced fairly easily by regular applications of nitrogenous fertilisers. Such a lawn should require mowing every seven to ten days, and thus little opportunity is given to new weeds to establish themselves. In fact during this time of the year, there are few annual weeds apart from crab grass which are a problem in home lawns or playing fields in this State, while perennial weeds are limited to white clover and flatweed.

In most cases, summer-growing weeds establish themselves either when the lawn is first planted or when the condition of the turf has deteriorated to a state where bare patches are common and the grass is making little growth. Crab grass makes vigorous growth early in the summer, particularly in bare areas, and this usually prevents the turf grass from growing over weak patches. Once established, crab grass is able to re-establish itself each summer, even in the most vigorous lawn, although the competition provided by such a turf will hold the weed growth in check.

The winter period provides different growing conditions for lawns and although it is possible to maintain the desired green appearance the rate of growth slows considerably. Because of this reduced competition, weeds are able to establish themselves more easily and for this reason a greater variety of weeds are found growing. The vigorous competition provided by weeds such as winter grass can stop the growth of the turf grass completely and any application of fertiliser usually results only in a stronger weed growth.

The need for selective weedkillers to control weeds in lawns has been realised for many years, and in the past chemicals such as sulphate of ammonia, copper sulphate and arsenic pentoxide have been widely used. With the development of so many new selective weedkillers during the last ten years, the use of these older chemicals has been largely superseded by

more selective ones which have a greater effect on the weeds and are less harmful to the lawn grass.

In Western Australia the most important lawn weeds are crab grass and winter grass and until recently no weedkiller had given satisfactory control of these two weeds without discolouring the lawn grasses. During the coming summer disodium-methyl-arsonate (D.S.M.A.) should become available from commercial firms for the control of crab grass while chlorophenyl-dimethylurea (C.M.U.) for the control of winter grass is already being marketed.

The use of these and other chemicals is discussed later.

There are still some weeds found growing in lawns which cannot be controlled selectively with chemicals and among these should be included nut grass, sour grass, Guildford grass and various sedges. It is fortunate that apart from Guildford grass none of these weeds is widespread.

Guildford grass reproduces by the formation of seed and the development of new corms each year below the ground. Mowing regularly at weekly intervals will control Guildford grass by preventing the development of the corm and seeds but the leaf must be cut each time rather than rolled over. A rotary type mower is ideal for this purpose. In extreme cases where mowing is not practical, Guildford grass can be controlled by spraying with an oil such as kerosene or a mixture of kerosene and sump oil. This treatment discolours the lawn completely and to be effective should be applied six weeks after the general emergence of weed has taken place. A further application five to six weeks later is often required. Following treatment the turf usually remains dormant for the winter period but makes a complete recovery during the spring.

Table 1 shows the more common weeds found in lawns and Column 3 lists the chemicals which can be used for their control. The most effective chemical for each weed is listed first.

The proprietary lines listed in Table 2 are available in small packs suitable for home garden use from the distributors shown. The amount of chemical shown in Column 5 is sufficient to treat 150 square yards and should be dissolved in 4 gallons of water.

LAWN GRASSES

There are a number of grasses used for lawns and because of their different characteristics the problem of weeds is not the same in all types. Similarly the reactions of lawn grasses to chemical treatments differ considerably.

Buffalo Grass.

Buffalo is probably the most common grass used for household lawns mainly because it is less aggressive than most other types. The wide coarse leaves form a dense lawn which is easily kept from intruding into gardens and paths, while any unevenness in the surface of the turf is not so obvious.

Weeds find it difficult to become established in buffalo lawns and, when in good condition, it is probably the only lawn which can check the vigorous growth of weeds like crab grass.

Buffalo grass will not withstand continuous wear and this, along with its spongy nature, makes it unsuitable for playing-fields. During the summer when buffalo is growing actively, it is easily discoloured by the application of weedkillers so that several applications of a weak concentration of hormone-like weedkiller may be more desirable than a single application of a strong solution. For the same reason C.M.U. or C.I.P.C. should only be applied during the winter.

Couch Grass.

The majority of playing-fields and a large proportion of household lawns are grassed with couch which is able to withstand hard wear and at the same time provide a firm even playing surface. Couch reacts quickly to the application of nitrogenous fertilisers and regular waterings and so provides keen competition to weed growth. However, during the winter the rate of growth slows considerably and persistent weeds are able to establish themselves. Weeds such as winter grass are often well established by the spring and make it difficult for couch to make growth during this time of the

Fig. 2.—Even and complete coverage is important and marking into convenient strips with string is recommended for spraying large areas

year and early summer, so that the use of chemical weedkillers is often of great benefit.

Couch grass is fairly tolerant to most selective weedkillers but is easily discoloured during the summer by the application of C.M.U. or C.I.P.C.

Superfine Couch.

This lawn grass was introduced commercially to Western Australia some years ago when it was widely publicised but experience has shown that it has some undesirable characteristics under local conditions. During the winter the loss of colour in superfine couch lawns makes the presence of weeds obvious while through the summer the lawn is easily scorched. Because of the fine appearance of the sward produced, any unevenness in the surface of the lawn is very noticeable. The spongy nature of this grass allows the mower to bite into the turf and remove a proportion of the green top growth leaving brown patches.

Superfine couch is related to the common couch grass and its susceptibility to chemicals is much the same.

Bent and Kentucky Blue.

These grasses are widely used in Melbourne for household lawns and under local conditions they are often planted in association with couch grass. The fine sward produced by them is very suitable for golf greens while their active growth during the winter is an added advantage. However, more frequent watering is required than with couch or buffalo during the summer.

They are more susceptible to hormone-like weedkillers than couch grass while because they make active growth at all times of the year, the use of C.M.U. or C.I.P.C. is not recommended.

Kikuyu.

Kikuyu lawns are often planted in areas where a shortage of water exists through the summer and under these circumstances this grass is very suitable. Under normal conditions, however, Kikuyu is not often favoured because of its habit of encroaching into gardens and paths. Weeds are not often a problem in these lawns and when they do appear selective weedkillers can be readily used.

CHEMICALS

Most garden plants are highly susceptible to weedkilling chemicals and care should always be taken to prevent the spray from drifting onto garden areas. Rain within eight hours of application

Fig. 3.—An even coverage of spray material is essential. The dark strips are patches of winter grass missed at the time of spraying

can reduce the effect of a chemical while windy conditions at the time of spraying can give uneven results. Even and complete coverage is important when spraying lawns and if the area to be treated is large, then marking into convenient strips with string is recommended. The action of selective weedkillers is usually slow so that lawns should not be cut for three weeks after spraying.

1. C.M.U. (Chloro-phenyl-dimethylurea).

This complex urea derivative should only be used on couch, superfine couch and buffalo grasses and then only during the winter months. When applied at the same rate during the summer, the lawn grass will be discoloured and the rate of growth retarded. C.M.U. is most effective against winter grass and annual clovers.

Rate of Application.—One ounce of 80 per cent. C.M.U. dissolved in 4 gallons of water is sufficient to treat 150 square yards. Frequent agitation is required to ensure that the C.M.U. does not settle.

This rate of application is effective against winter grass in the seedling stage but for large plants the rate should be increased to 1½ ounces per 150 square yards.

The action of C.M.U. is slow and little effect is seen for 10 to 14 days after treatment, while maximum results are only seen after three to four weeks. Because C.M.U. can accumulate in the soil no more than one spraying should be made within a period of six weeks.

2. D.N.O.C. (Sodium dinitro-ortho-cresylate).

This yellow dye is extremely safe to use because of the high tolerance grasses have for it. Capeweed, cotula and annual clovers are very susceptible but other broad-leaved weeds such as flatweed and onehunga weed are more resistant. A number of applications can be made, if necesary, at weekly intervals without damaging the lawn.

Rate of Application.—Six fluid ounces of 30 per cent. D.N.O.C. dissolved in 4 gallons of water is sufficient to treat 150 square yards. Better results are obtained if a teaspoonful of an activator such as sulphate of ammonia is added to each gallon of solution.

3. C.I.P.C. (Isopropyl-chlorophenyl-carbamate).

Chloro I.P.C. has given control of winter grass and annual clovers but the lawn grass is usually discoloured to some extent. Because of this discolouration and lower effectiveness the use of C.M.U. is preferred.

4. 2,4-D (2,4-Dichloro-phenoxy-acetic acid).

There are two common types of 2,4-D used for weed spraying, these are the amine and ester derivatives, and although the latter types are the more effective, some caution must be exercised when using them, because of their volatility. Where weeds growing near garden areas are to be sprayed, the use of the amine derivative is preferred while for areas such as bowling greens and playing-fields, the ester type can be used. Most broad leaved weeds are susceptible to 2,4-D.

Rate of Application.—Two fluid ounces of 50 per cent. 2,4-D amine or 40 per cent. 2,4-D ester dissolved in four gallons of water is sufficient to treat 150 square yards of lawn. A second application 10 days later may be required.

5. 2,4,5-T (2,4,5-Trichloro-phenoxy-acetic acid).

This hormone-like weedkiller is closely related to 2,4-D and in the past has proved most effective against woody plants. When applied to lawns 2,4,5-T has given good control of clovers and has proved superior to 2,4-D. However, it is not as effective as 2,4-D against other common lawn weeds and because of its volatility 2,4,5-T should only be used for the control of clovers some distance from garden areas.

Rate of Application.—Two fluid ounces of 40 per cent 2,4,5-T ester dissolved in four gallons of water is sufficient to treat 150 square yards of lawn.

6. D.S.M.A. (Disodium-methyl-arsonate).

This chemical was first tested for the control of crab grass in 1956 and early trials showed it to be superior to potassium cyanate which has been so widely used. D.S.M.A. has the advantages of not discolouring the lawn and is effective against large plants as well as seedlings. Two forms of D.S.M.A. have been tested and the pentahydrate has been found superior to the hexahydrate form which causes some discolouration to the lawn grass. D.S.M.A. should be available from commercial firms next summer.

Rate of Application.—For crab grass in the seedling stage 4 ounces of 75 per cent. D.S.M.A. dissolved in 4 gallons of water is sufficient to treat 150 square yards and a second application 7 days later is required. When the crab grass is past the seedling stage the rate of application should be increased to 6 ounces for each 150 square yards. The area to be treated should be watered the previous day so that the lawn can be left dry for 5 to 6 days after the chemical is applied.

Table 1.

THE MOST COMMON WEEDS FOUND IN LAWNS.

Weed.	Botanical Name.	Treatment.	Time to Spray.
Annual Clovers	*Trifolium spp.*	C.M.U. 2,4,5-T or 2,4-D	Autumn or winter
Capeweed	*Cryptostemma calendula*	D.N.O.C. or 2,4-D	Autumn or winter
Corkscrew or Wild geranium	*Erodium spp.*	2,4-D	Autumn or winter
Cotula or Mustard weed	*Cotula australis*	D.N.O.C. or 2,4-D	Autumn or winter
Crab grass	*Digitaria sanguinalis*	D.S.M.A.	Early summer
Flatweed	*Hypochoeris spp.*	2,4-D	Winter or summer
Guildford grass	*Romulea rosea*	Resistant	....
Mosses		Mercurous chloride	Autumn or winter
Nut grass	*Cyperus rotundus*	Resistant	....
Onehunga	*Soliva sessilis*	2,4-D	Autumn or winter
Perennial clovers	*Trifolium spp.*	2,4,5-T or 2,4-D	Winter or summer
Sour grass or Soursob	*Oxalis spp.*	Resistant	....
Winter grass	*Poa annua*	C.M.U. or C.I.P.C.	Autumn or winter

Column 3 lists the chemicals which are effective, the first one shown being preferred.

Fig. 4.—An application of C.M.U. has removed the clover from the area in the foreground of the photograph, but this treatment has had no effect on the flat-weed

7. Mercurous Chloride.

The standard treatment for the control of moss has been the application of a solution containing one ounce of potassium permanganate (Condy's crystals) and one ounce of copper sulphate (bluestone) dissolved in four gallons of water and applied at the rate of one gallon per square yard. Probably a more effective treatment, however, is the use of a solution containing one ounce of mercurous chloride (calomel) dissolved in two gallons of water and applied at the rate of one gallon per 15 square yards.

Table 2.
TABLE OF AVAILABLE CHEMICALS.

Trade Name.	Distributor.	Type.	Concentration.	Quantities to 4 gals.
			%	
AK.100	Elder Smith & Co. Ltd. Westralian Farmers Ltd.	C.M.U.	80	1 oz.
Karmex W.	Agricultural Products Co. David Gray & Co. Ltd. Dawson Harrison Ltd. Mobile Industrial Equipment Ltd.	C.M.U.	80	1 oz.
Nocweed C.I.P.C.	Lanes Pty. Ltd.	C.I.P.C.	50	2 fl. oz.
Warners C.I.P.C.	Agricultural Products Co.	C.I.P.C.	50	2 fl. oz.
Nocweed D.	Dawson Harrison Ltd. Lanes Pty. Ltd.	D.N.O.C.	30	6 fl. oz.
Blue Cross 2,4-D ester	Agricultural Products Co.	2,4-D ester	40	2 fl. oz.
Clover Killer	David Gray & Co. Ltd.	2,4-D ester	40	2 fl. oz.
Estex 40	Wilcox Mofflin Ltd.	2,4-D ester	40	2 fl. oz.
Lawn Weedkiller	Dawson Harrison Ltd.	2,4-D ester	36	2 fl. oz.
Nocweed E.	Lanes Pty. Ltd.	2,4-D ester	50	1½ fl. oz.
Blue Cross 2,4-D amine	Agricultural Products Co.	2,4-D amine	40	2½ fl. oz.
Hormex	Wilcox Mofflin Ltd.	2,4-D amine	50	2 fl. oz.
Nocweed A.	Lanes Pty. Ltd.	2,4-D amine	50	2 fl. oz.
Blackberry Killer	Dawson Harrison Ltd.	2,4,5-T	50	2 fl. oz.
Butoxone	Elder Smith & Co. Ltd. Westralian Farmers Ltd.	2,4,5-T	80	1 fl. oz.
David Gray's 2,4,5-T	David Gray & Co. Ltd.	2,4,5-T	40	2 fl. oz.
Nocweed 2,4,5-T	Lanes Pty. Ltd.	2,4,5-T	80	1 fl. oz.
Super Trimex	Wilcox Mofflin	2,4,5-T	40	2 fl. oz.

The above distributors have indicated that the proprietary lines listed are available in small packs suitable for home garden use. Column 5 shows the amount of chemical which should be dissolved in four gallons of water to spray 150 square yards.

FAT LAMB PRODUCTION IN WESTERN AUSTRALIA

—*continued*

By N. DAVENPORT, B.Sc. (Agric.), Senior Adviser Meat Production

SOUND management of the flock is essential for successful lamb raising. Aspects such as mating practice, nutrition, disease control, marketing arrangements and general care of the flock all have an important bearing on the success of the venture.

Following a teasing period of a fortnight using either vasectomised or entire rams, the mating period should extend for at least seven weeks to allow of three oestral periods. There are always, in any flock, some ewes which come into the breeding season later than others. Many breeders prefer to leave the rams in for a fortnight or more longer, contending that a late lamb is better than no lamb.

The first part of this article, appeared in the March-April, 1957 issue, pages 233 to 246.

NUTRITION

It is hardly possible to over-emphasise the importance of nutrition in lamb production. Inadequate nutrition is often the main cause of loss of many lambs and ewes prior to and during the lambing period.

By the end of the flushing period and as a result of it, the ewes will have increased somewhat in condition. From then on, for about the first two-thirds of pregancy, their food requirements will be very little above those for dry sheep. During this period, the ewes, should not be fat and preferably in good store condition or a little better. Paddock grazing at this time will usually ensure this but, if not, a small ration of grain or hay should be fed, or alternatively the ewes could have access to pastures which have been mown and left in the paddock.

The nutritional needs of the pregnant ewe increase considerably during the last six or eight weeks of the gestation period.

The foetus, or unborn lamb, makes most of its growth in this period, while at the same time, the ewe's body is adjusting itself in preparation for the act of lambing and the udder is developing to ensure the well-being of the lamb. Meanwhile, the food intake must continue to provide for the ewe's normal bodily maintenance and wool growth. To meet these simultaneous demands, an ample supply of nutritious food is required.

Fig. 1.—Grain storage bins at Muresk Agricultural College. Adequate grain reserves, safely stored, will ensure a good level of nutrition during the summer and autumn

As a large percentage of the lambing takes place in the late autumn and early winter period, the paddock feed is apt to be lacking in both quality and quantity during the most critical period of the pregnancy. It is essential therefore to supplement the sparse grazing by hand-feeding with grain and-or hay.

It has been shown that ewes lambed satisfactorily and without losses from pregnancy toxaemia when fed, during the last six weeks or so of pregnancy, a ration of ½ lb. of wheat grain per day with some cereal hay where the ordinary paddock grazing was poor. However, such a grain ration must be considered as the minimum and a higher rate could be used and so ensure ample milk supplies and strong healthy lambs. Up to 1 lb. of oats or 13 to 14 oz. of wheat or barley are suitable quantities. Where grain is not available these rates can be replaced by 1½ to 2 lb. of good meadow hay. While research has shown that still higher levels of prenatal feeding will produce heavier lambs, which grow faster and hence reach marketable size and condition more quickly, it is doubtful whether such heavy feeding is justified.

Grain can be fed either in feeders or trickled out in a long thin line on hard ground. Experiments have shown that better results are obtained by feeding two or three times a week rather than daily. This allows the less vigorous sheep to obtain their share. Feeding arrangements should be such that all sheep can feed at the one time. Hay may be fed from self-feeders or distributed in the paddocks once or twice each week. The periods between feeding out will, of course be influenced by weather conditions.

Nutrition after lambing is also very important. The growth of the lamb is largely dependent upon the milk supply of the mother; it is wholly so during the first six to eight weeks of its life. It is obvious therefore that the ewe should be well fed throughout her lactation to ensure a good milk supply. While paddock feed is usually ample and of good quality from mid-winter onwards it is commonly inadequate prior to this, and provision must be made for this deficiency. Early cereal crops of barley or oats are very suitable grazing for newly-lambed ewes. Until such grazing or the new seasons pasture is sufficiently developed, supplementary feeding of hay or grain or both should be continued.

There is a tendency among some farmers to cease hay-feeding too soon. Young pasture is very rich in protein on a dry basis but very high in moisture and much better use is made of this grazing when some hay is also available.

CRUTCHING

This operation is not only necessary for the control of fly strike but also to enable the newly-born lamb to have ready access to the udder. It should be carried out preferably about four to six weeks before lambing is expected to commence. The ewe should be handled with care. Rough treatment could result in lambing troubles particularly malpresentation and premature birth. Crutching may be done somewhat closer to lambing if circumstances make this unavoidable but extreme care is necessary.

Fig. 2.—Ample reserves of hay should be provided for the autumn-early winter period

LAMBING TIME

After crutching, the ewes should be put into fresh paddocks specially reserved for the purpose, particularly as they should be drenched for worms at this time. If these paddocks are reasonably handy, inspection of the flocks can be carried out more readily and with the minimum of travel. Inspections should be made at least daily before lambing commences and whilst lambing, twice daily inspections are desirable. Plenty of attention at this time can reduce losses of both ewes and lambs. With lack of attention these can be considerable.

LAMB MARKING

These operations should be done early, preferably when the lamb is about two weeks old and if possible not later than four weeks. The older the lamb the greater is the check in growth from shock and loss of blood. Usually two or three markings are necessary according to the duration of the lambing period.

The operation should be carried out in fine weather and should be performed quickly and hygienically. It is essential to commence with sterilised instruments and to sterilise them at frequent intervals. A 5 per cent. solution of lysol or dettol (1 oz. to 1 pint of water) is suitable for the purpose. Marking should not be done in permanent yards but in the paddock in temporary yards in order to minimise the possibility of infection of the wounds by tetanus and other organisms.

It is often preferred to separate the lambs from the ewes and put the ewes back into the paddock. As the lambs are treated they can then be put quietly down outside the yards to be mothered. The work should cease early enough to ensure that all lambs are mothered by nightfall.

No antiseptic need be applied to the wounds. Healing will take place more readily and with less trouble without it.

Several methods of castrating and docking are in use, including the knife, constricting rubber rings, crushing type pincers and hot iron. Investigations have shown that the other methods have no advantage over the knife in degrees of

check to growth rate and extent of infection of the wounds. A higher incidence of tetanus has been observed on occasions where rubber rings have been used, and there is also a greater risk of other infection because of the longer time required for the wounds to heal.

SHEARING THE LAMB

In breeding sucker lambs one of the principal aims is to have them ready for market before the feed commences to dry off and before grass seeds become a problem.

However, it is sometimes found, particularly in short seasons, that it is not possible to have all lambs in marketable condition and off the farm by this time. Those not ready should be shorn as they will then finish much better and damage from grass seeds will be avoided. Lambs which are to be carried over for any period should certainly be shorn.

Bruising and cuts due to shearing take some time to heal and may show in the carcass up to a fortnight later. This is of importance when deciding when to market and particularly if the lambs are being exported on consignment.

DISEASE CONTROL

Failure to safeguard the health of the flock may result in considerable financial loss. In addition to actual deaths, wool yields and lambing percentages can be seriously reduced. Adequate nutrition is the first step in disease control. Well-fed sheep have a much higher resistance to disease than poorly-fed sheep.

The most important diseases associated with fat lamb raising are commented upon briefly in the following text. Further and more detailed information may be obtained from the Agricultural Journal and appropriate bulletins published by this Department and issued free to bona fide farmers.

Pregnancy Toxaemia (Twin lamb disease) is a serious disease of the prenatal period and high mortality can occur. It is more prevalent in ewes with a multiple pregnancy. In practically every case the trouble develops as a result of ewes being poorly fed during the six weeks or so prior to lambing. It may also develop through temporary starvation during this period such as by leaving them in the yards overnight without feed or by trucking over long distances.

Little can be done for affected sheep and death usually results although some measure of cure of early cases may be obtained by drenching daily with 4 to 6 oz. of glycerine mixed with an equal quantity of water.

Hypocalcaemia (Milk fever) occurs usually within a few days after lambing or less commonly shortly before lambing, although it has been known to occur at other times.

The onset of the disease is sudden and the symptoms consist of dullness, unsteadiness of gait, muscular tremors and coma followed by death within a few hours up to two or three days. Injection of a solution of calcium borogluconate ($\frac{1}{2}$ oz. in 2 oz. water) under the skin or into the jugular vein will in nearly all cases result in rapid recovery. Since driving or yarding are predisposing factors to the disease, freshly-lambed ewes and those close to lambing should be moved quietly and on no account left in yards overnight.

Enterotoxaemia (Pulpy kidney) is mainly a disease of the flush season. The majority of outbreaks occur between April and October when green feed is abundant, but the disease may also develop during the dry season, particularly if heavy grain feeding is carried out. High feed intake and lack of exercise are predisposing factors. Sheep of all ages are susceptible but lambs seldom become affected before 10 to 12 weeks old. Sick sheep are very rarely observed and it is usual to find their carcasses in the paddock highly distended with gas, discoloured and undergoing rapid decomposition.

Inoculation with enterotoxaemia vaccine is a very practical and effective means of prevention. A single injection is usually satisfactory but where the disease is known to be a problem a second inoculation after 30 days is strongly recommended. Inoculation should be carried out in the autumn, in association with crutching. This is a very suitable time. When carry-over lambs are to be fattened they should be inoculated immediately beforehand.

Fig. 3.—Inoculation of ewes against enterotoxaemia should be routine practice at crutching time

Arthritis in lambs can be important chiefly because of the temporary check in growth and the loss of condition in varying degree which can occur. The mortality rate is low and the majority make a complete recovery from a few days up to to two or three weeks from the onset of symptoms. In a small proportion of cases affected lambs become chronically lame and cease to thrive. The condition usually results from infection of tailing and castrating wounds by organisms present in the soil. It can also develop before marking by infection through the umbilical cord. Control is by the prevention of infection of marking wounds as already mentioned under "Lamb Marking."

Worms.—Serious worm infestation of pastures can occur during the spring and summer months. In order to reduce the incidence of worms in the flock to a minimum, ewes should be drenched some weeks before lambing say at crutching time. Lambs are rarely affected during the winter. Those not sold as suckers should be drenched at weaning and also following any appreciable summer rain.

For worm control, good feeding is no less important than systematic drenching. Carryover lambs and weaner breeding ewes should have special paddocks reserves for summer grazing and receive an ample grain or meadow hay ration when necessary. They should not remain over long in any one paddock.

Clover Disease.—This disease develops as the result of grazing subterranean clover dominant pastures during the growing

season. Ewes fail to get in lamb, many of those in lamb have trouble at lambing (distocia) and lambs are often born dead. Some months after lambing, prolapse and inversion of the uterus may occur. Losses of both lambs and ewes can be appreciable and lambing percentages due to infertility may be as low as 20 per cent. or even lower. The disease can be controlled by avoiding grazing on sub-clover dominant pastures. This calls for sound pasture and sheep management. The development of balanced pastures, the provision of early cereal crops for grazing and ample hay reserves are important and effective factors for control.

Epididymitis.—As mentioned previously, this disease can cause a serious reduction in lambing percentages. Rams should be inspected regularly, particularly prior to joining, and affected animals destroyed. If the disease is present, young rams should be isolated from the remainder when not in use and also if possible mated separately from the older rams.

MARKETING

The price levels of the lamb market follow a similar pattern each year governed by supply and demand. The marketing of sucker lambs usually commences early in July and prices are then relatively high. Supplies increase rapidly with the result that price levels fall progressively until the local demand is met which is generally early in September. This is followed by a period during which there is surplus to home requirements and exporters operate freely. Prices are then maintained at near export parity until this period of surplus is over, usually towards the end of November, when with diminishing supplies there is again a general rise in price levels. The sucker season terminates about the end of December.

The grower can sell his lambs in several ways as he so desires. They can be sold locally or to an outside buyer in the paddock or forwarded to the Metropolitan Market at Midland Junction for sale by auction or exported on his own account through the W.A. Meat Export Co. Robbs Jetty.

Lambs should be sold when "finished," i.e. when well fleshed and commencing to put on fat but before they are overfat. Excess fat is not wanted today. Carcasses weighing 28 to 36 lb. are most in demand. Marketable weight depends to some extent on the breed and on the individual lamb. Those from the heavier sires such as the Dorset Horn and Border Leicester will be "finished" at rather higher weights than Southdown cross lambs. Lambs dress out rather less than 50 per cent. of their live farm weight, varying with the season and the breed. Southdown cross lambs generally dress out at a higher percentage than those sired by other breeds.

The lamb is a delicate animal easily bruised and injured and should always be handled with care. Particularly is this so at marketing time. Rough treatment in the yards or in transit can result in an appreciable loss in value.

INSPECTION OF WOOL CLIPS

The Director of Agriculture, Mr. G. K. Baron Hay, advises that, with shearing now well under way, growers are reminded that officers of the Department of Agriculture's Sheep and Wool section will, upon request, inspect clips on brokers' show floors.

Clips will be inspected for classing, quality, etc., and a full report forwarded to growers.

Woolgrowers desiring to participate in this service are requested to make a written application to Officer-in-Charge, Sheep and Wool Section, Department of Agriculture, Perth, and advise their broker, brand and sale number in which clip is being offered.

HYPOCALCAEMIA (Milk Fever, Grass Tetany) IN BREEDING EWES

By

C. R. TOOP, B.V.Sc.,
Chief Veterinary Surgeon

IN early seasons, when green feed is abundant about the time of lambing, widespread outbreaks of hypocalcaemia are likely to occur in breeding ewes and unless preventive measures are adopted serious losses may be sustained.

Hypocalcaemia results from a lowering of the calcium content of the blood and in this respect the disease in sheep resembles the condition of milk fever which affects dairy cows about the time of calving. Pregnant and lactating ewes are most commonly affected, especially when grazing on lush pastures or on young cereal crops. Under such conditions droving even for a short distance or a brief period of starvation resulting from yarding may precipitate an attack.

Hypocalcaemia is not, however, confined to lambing ewes but may also affect dry ewes as well as rams, wethers and young sheep. The outbreaks which occur amongst dry sheep are usually associated with a sudden check to feeding such as may result from shearing, crutching or dipping, or transport by road or rail. The grazing by hungry sheep of plants rich in oxalates such as sorrel or soursobs may also produce the disease.

The onset of the disease is sudden and the symptoms consist of dullness, unsteadiness of gait, muscular tremors and coma, followed by death within a few hours or the animals may survive for two or three days.

For the treatment of the disease the injection of a solution of calcium boroglu-conate for the purpose of restoring the blood calcium to its normal level is recommended and this in the majority of cases is followed by a rapid and often quite spectacular recovery.

The prevention of the disease is largely a matter of management and in seasons which favour its occurrence care should be exercised with the handling of in-lamb and milking ewes so as to avoid unnecessary driving or yarding for unduly long periods.

CAUSE

As the name hypocalcaemia denotes, the disease is associated with a reduction of the calcium content of the blood, which in severe cases may fall to considerably less than half the normal level. It may occur under a wide range of conditions but in breeding ewes it is most likely to make its appearance in seasons where there is an early and luxuriant growth of green feed. In pregnant and lactating ewes, grazing on lush pastures or on young wheat or oat crops favours the development of the disease and the risk is increased by droving or yarding. Even driving for a short distance such as from the paddocks to the yards may precipitate an attack. So also may a brief period of starvation resulting

from yarding overnight or even for a few hours, particularly if the ewes are driven when released from the yards.

Amongst other factors which may predispose to the disease may be mentioned:—(a) The turning of hungry sheep on to green feed after train journeys. (b) The grazing of hungry sheep on pastures in which plants rich in oxalates such as sorrel, soursobs, or roly poly are abundant. Oxalates reduce the calcium content of the blood. (c) A sudden check to feeding such as may result from shearing, crutching or trucking particularly if this is followed by droving. (d) Heavy feeding on cereal grains or cereal chaff which are low in calcium. Sheep fed on these products do not develop hypocalcaemia unless deprived of roughage in the form of dry grazing, clover burr or scrub which contain adequate amounts of calcium and do not develop symptoms unless driven.

In Western Australia, hypocalcaemia in dry sheep appears to be of infrequent occurrence, but outbreaks have been met with in weaners released on to green feed after long rail journeys, as well as in wethers after prolonged yarding.

SYMPTOMS

The disease occurs principally amongst in-lamb and milking ewes which may become affected from six weeks prior to lambing up to about 10 weeks afterwards. Its onset is sudden and a considerable number of animals may show symptoms at the same time. The early symptoms consist of staggering or unsteadiness of gait with a stiff or stilted action usually affecting the hind legs but sometimes all four legs. Affected sheep are dull and listless and disinclined to move. When driven they show symptoms of trembling and shivering while in motion. There is usually a watery discharge from the nostrils and some cases may show evidence of scouring. Soon the animal goes down and is unable to rise and sinks into a condition of coma. A characteristic posture has been described in which the animal lies on the brisket with the hind legs straddled out behind and with the neck extended and the lower jaw resting on the ground, but this has not been observed in the cases coming under our notice. Without appropriate treatment death may occur within a few hours but some cases may linger for two to three days.

POST MORTEM APPEARANCES

At post mortem nothing of diagnostic significance will be observed. The third stomach or "bible" is usually hard and contracted and the caecum or blind gut may be distended with gas and thereby considerably enlarged. The liver and kidneys are congested and there may be large haemorrhages on the external surface of the heart.

DIAGNOSIS

From a consideration of the history of the outbreak, the class of animal affected and the symptoms exhibited the diagnosis of hypocalceamia should in most cases present no serious difficulty. In the case of ewes advanced in pregnancy it might possibly be confused with pregnancy toxaemia. The symptoms of stupor and partial or complete blindness which occur in pregnancy toxaemia are, however, distinctive and the animal lingers from several days to a week before death occurs. In addition, the liver in pregnancy toxaemia is infiltrated with fat being characteristically pale yellow in colour and very soft, whereas in hypocalcaemia it shows little abnormality. Finally, pregnancy toxaemia is most likely to occur during adverse seasons when the ewes are losing condition, whereas in hypocalcaemia the reverse usually obtains.

Should any doubt exist in the matter a sample of blood comprising about four ounces should be obtained from an affected animal and forwarded to the Animal Health and Nutrition Laboratory for calcium determination.

As a practical means of diagnosis an affected sheep may be injected with the prescribed dose of calcium borogluconate and should prompt recovery occur this will leave no doubt regarding the condition with which the animal is affected.

TREATMENT

For the treatment of affected animals the injection of a solution of calcium borogluconate is recommended. When administered in the prescribed dosage this will increase the calcium content of the

blood to the normal level, resulting in rapid recovery. Calcium borogluconate is available in packets containing 2½ ounces which is sufficient for the treatment of five sheep. The contents of the packet are dissolved in 10 ounces of boiling water and the solution is allowed to cool before use. The dosage for the sheep is 60 c.cs. (two ounces) and this should be injected either into the jugular vein or beneath the skin using a large hypodermic syringe.

Alternatively a solution of calcium borogluconate may be prepared in accordance with the following formula:—

	ounces.
Calcium gluconate	8
Boric acid	2
	pints.
Water	2

Upon boiling these ingredients together a clear solution will be produced. This should be allowed to cool and injected in a dosage of 60 c.c. If it is desired to store the solution a few drops of Thymol should be added to prevent the growth of moulds.

Following the administration of calcium borogluconate in the dosage prescribed above, complete recovery will usually occur within a few minutes to half an hour or a little longer. Should no response have occurred after an hour the injection should be repeated.

In the case of wet ewes a satisfactory response may be obtained by the inflation of the udder with air in the manner employed for the treatment of dairy cows suffering from milk fever. In an emergency a bicycle pump may be used inserting the valve from which the rubber has been removed into the teat duct and inflating each of the quarters firmly but not over-tightly with the air. The valve should be sterilised by boiling before use and after inflation the end of the teat should be pinched to prevent the escape of air. When a milk fever outfit of the type supplied for the treatment of cattle is employed, the large teat tube or siphon which might damage the teat duct of the ewe should be substituted by a hypodermic needle with the point removed and rounded off by filing.

When supplies of calcium borogluconate are unavailable drenching with molasses in a dosage of half a pint mixed with an equal volume of water may be practised. Molasses contains readily available calcium salts and may be effective in the treatment of early cases. It should not, however, be regarded as a substitute for calcium borogluconate.

PREVENTION

Since the disease is likely to make its appearance amongst breeding ewes in early seasons when green feed is plentiful on all parts of a property during or just prior to lambing the adoption of preventive measures will in many instances prove difficult. Under these conditions, roughage in the form of hay should be distributed to the ewes in the paddocks or where a haystack is available in the paddock the flock should be allowed free access to it. Since driving or deprivation of food for even a short period may predispose to the disease in lambing ewes the flock should as far as possible be left undisturbed.

Where yarding cannot be avoided, the flock should be driven slowly and quietly and retained in the yards for as short a period as possible. Yarding overnight should at all costs be avoided. Droving after yarding should whenever possible also be avoided.

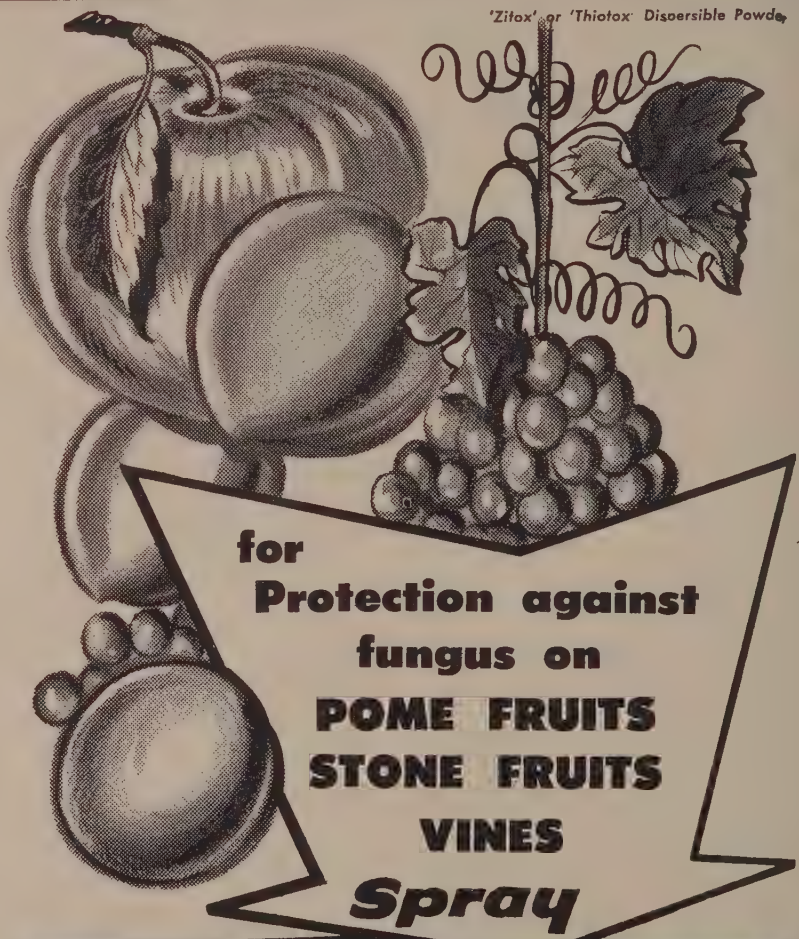
The grazing of young wheat or oat crops should at first be restricted to a short period daily and the ewes should be fed roughage before being turned on to the paddock. Later as the crop is eaten back and the animals become accustomed to the change of diet the period of grazing may be lengthened.

When an outbreak has actually occurred a change to poorer pasture in another paddock will usually prevent further losses.

In the case of ewes fed heavily on cereal grains in the absence of suitable roughage a lick composed of two parts of ground limestone and one part of salt should be provided.

Hungry sheep should not be allowed access to plants with a high oxalate content.

'Zitox' or 'Thiotox' Dispersible Powder



for
Protection against
fungus on
POME FRUITS
STONE FRUITS
VINES
Spray
"ZITOX"
or "THIOTOX"
Dispersible Powder

. . . harmless to all types of fruit and foliage.
Particularly valuable for use on crops susceptible to damage by copper and sulphur sprays.
Leaves no visible residue.

AVAILABLE FROM YOUR USUAL SUPPLIER

DEPENDABLE PLANT PROTECTION PRODUCTS
IMPERIAL CHEMICAL INDUSTRIES OF AUSTRALIA & NEW ZEALAND LTD.

1937. THI. 11X. 4608B

INSECT Pests AND THEIR CONTROL

By C. F. H. JENKINS, M.A., Government Entomologist

THE SAN JOSE SCALE

Quadraspidiotus perniciosus (Comst.)

By C. F. H. JENKINS, M.A., Government Entomologist

THE San Jose scale (pronounced San Hozay), sometimes known as the pernicious scale, has been described by American authors as potentially capable of doing more damage than any other insect occurring in orchards of the Pacific North-West. Fortunately the pest is not the scourge in this State that it is in many parts of Europe and America, but on account of the strict quarantine barriers raised by many countries against fruit even lightly infested with San Jose scale, the matter of its control is of paramount importance.

The original home of the scale is believed to be China, but the popular name is derived from San Jose, California, where the insect was inadvertently introduced about 1870 and from whence it spread to many parts of the United States. It is now widely distributed in many parts of the world and reached Western Australia some time prior to 1897.

DESCRIPTION

Like the citrus red scale the San Jose scale is what is called a hard or armoured scale, that is, the protective shell-like covering is relatively hard, and detachable from the living insect.

The scale of the adult female is about one-twelfth of an inch in diameter and so smaller than the majority of scales met with on local fruit trees. It is circular, ashy-brown in colour with perhaps a lightish centre or nipple. The insect that lives beneath the scale is a delicate pear-shaped creature yellow in colour. Like all scale insects it possesses long hair-like mouth parts which are inserted deeply into the plant tissues. The half-grown scales are darker than the adults, appearing almost like black dots to the unaided eye. The male scale is smaller than the female and oblong in shape. The actual male insect is an active winged creature with thread-like plumes forming a kind of tail characteristic of many male scale insects.

LIFE HISTORY AND HABITS

The young of this scale are born alive and commence to make their appearance in the early summer. Accurate local figures are not available, but in America the average reproductive period for a female is about 40 days during which 400 offspring may be produced.

On first emerging, the young, or "crawlers," lead an active life, having well-developed legs and antennae or feelers. They soon settle down however, and with the first moult, or skin shedding,

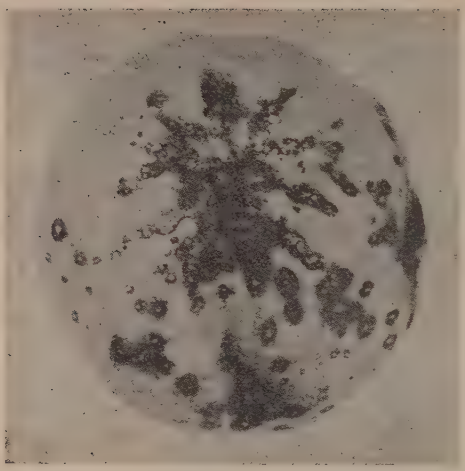


Fig. 1.—San Jose scale on apple, showing the scales themselves and the typical discolouration caused by them

lose all appendages and remain fixed for life. After a second moult, maturity is reached. The time required for this development varies from about six weeks in the summer to several months in the winter. The young are seldom active for more than a few hours or perhaps two days and usually settle near the parent. They then commence to cover themselves with cotton-like threads which finally mass and form with the cast skins a continuous scale covering.

Several generations may develop locally but development varies with individuals and so scales of various ages may be found at one time on a single tree. The winter is usually passed in the immature state, the scales of the last generation gradually developing so as to reach maturity by the following summer.

TYPE OF INJURY

Apart from the loss of sap endured by trees heavily infested with this scale, certain toxic effects are attributed to its attacks which aid in the killing of young shoots and limbs and finally of the tree. The scale infests all parts of its host, leaves, fruit and branches, and even when the scale has been knocked off, especially on fruits, the reddish discolouration of the skin and flesh beneath betrays the former whereabouts of the pest.

HOST PLANTS

The most seriously affected fruits in this State are apples and pears, but nectarines, peaches, plums and many other deciduous plants are also liable to attack. As previously stated, its importance is not so much on account of its uncontrollability or the actual damage done, as to the serious losses sustained by would-be apple exporters when a whole line may be condemned on account of a few infested fruits.

DISTRIBUTION AND MEANS OF DISPERSAL

The pest is by no means universally found in our local orchards but has a wide and scattered distribution. On this account it behoves all orchardists to take steps to control it where present and prevent its introduction where they are fortunate enough to be free. Infested nursery stock is undoubtedly the chief means of spreading this pest. As regards internal spread in an orchard, wind is probably the most important factor, but "crawlers" may

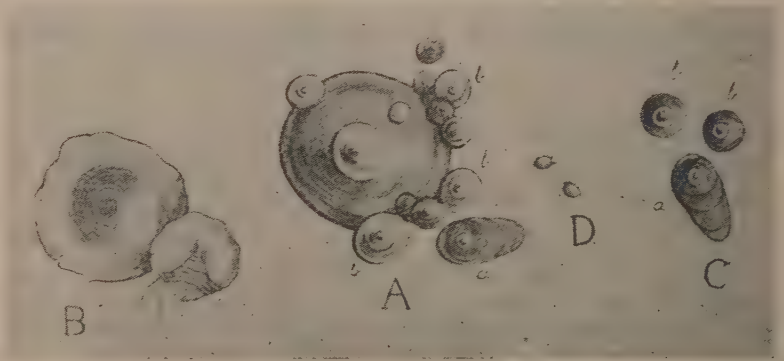


Fig. 2.—Various stages of San Jose scale, all enlarged about 15 times. A—Adult female scale with immature young of various stages settles around and upon her; B—An adult female scale turned over revealing the insect herself with the bristle-like mouth-parts exposed; C—An adult male scale with two immature winter-stage scales; D—Young crawlers soon after birth

also cling to the legs of birds and insects or to other foreign bodies and be carried certain distances.

INFLUENCE OF CLIMATE

The reason this scale has not assumed the role of a major pest from the point of view of actual damage done in Western Australia, is probably due to climatic conditions. It is possible that the relatively long dry summer is not congenial to the insect and so prevents it from reproducing to the maximum. The relative lightness of local infestation has sometimes been attributed to parasites and predators but unfortunately there is little evidence to support this contention.

CONTROL

Control measures, which are compulsory on orchards where the scale is present, must be taken in the late dormant period. Early September is the best time for applying lime sulphur or superior dormant oil to apple trees but an earlier treatment will be necessary on some stone fruits. Of equal importance to time of application is the need for a complete wetting of the trees by the spray. A thorough cover by the spray solution on every twig and in every crevice in the bark is necessary for, unless spraying is properly done, much time and effort may be wasted.

It should be remembered that San Jose scale will attack all kinds of deciduous fruit trees, so that stone fruits such as peaches and nectarines must not be neglected. They should receive an early "spot" spraying in August to ensure application before blossoming.

Sprays recommended are:—

1. **Dormant Period:**

   Superior dormant oil 3 gallons to 100 gallons of water.

   Or lime sulphur 14 gallons to 100 gallons of water.

2. **Summer Period:**

   White spraying oil 1 gallon; 50 per cent. Malathion.

   1¼ pints; water 100 gallons.

On badly-infested properties two dormant sprays, one of lime sulphur in August and another of superior oil in September are strongly recommended for the elimination of this pest in one season.

As well as dealing with San Jose scale these sprays are effective against other scale insects and various types of mites including the bryobia mite.

An important feature to remember in connection with any spray programme is that how you spray is just as important as the material you use.

Correct material applied thoroughly at the right time will give good scale control.

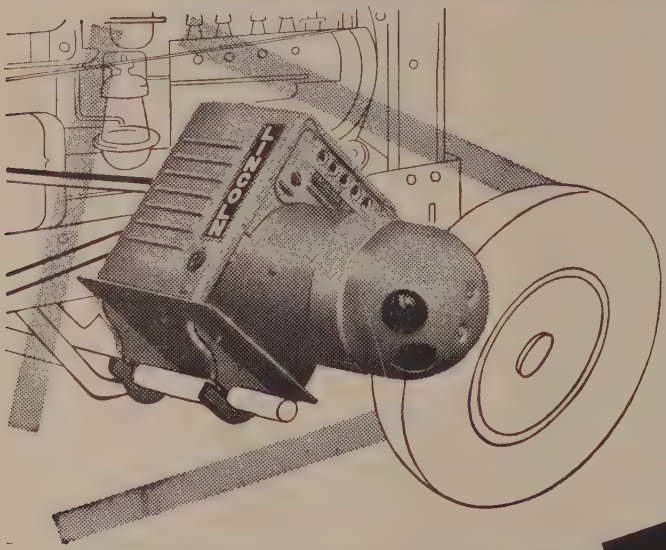
FARMERS

This is YOUR Journal, and it has been written, edited and presented in a sincere endeavour to give you helpful information in an interesting manner.

We would like to have your views on the Journal—to know whether you like it or whether you don't. Drop a line to the editor and tell him the features you like and don't like in this issue—or the features you hope to see in future issues.

SAVE £21 NOW

INCREASED PRODUCTION REDUCES LINCWELDER PRICES



Yes, **you** can now own the famous Lincwelder "250 BT" generator because of Lincoln's management policy of producing a better product at the lowest price. New price is only £114, giving you a clear saving of £21.

No other farm welder in Australia has the features, welding range and performance of the "250 BT." It welds all metals, solders, brazes, cuts and hardfaces and, mounted on your tractor, becomes a mobile workshop that goes anywhere you need it.

~~£135~~ £114

Now you pay only for the big modern

LINCWELDER 250 BT FARM WELDER

Quality finish and BIG output are unchanged, only the price is reduced—so now is the time to buy. Ask any Lincwelder owner, see what he's done and made; and you'll agree the Lincwelder 250 BT is the most useful tool of its type in Australia today. See your local Wesfarmers Agent for a demonstration or post the coupon for details

REPAIRS equipment breaks on the spot. Welds thick metal sections brazes, solders and cuts.

BUILDS new equipment, steel buildings, stockyards or gates for a fraction of shop price.

EXTENDS the life of worn ploughshares, tynes, discs, etc. by hardsurfacing. Increases life five to six times for a few pence per unit.

LIGHTS your workshop or home, powers tools, etc., with handy 32-volt current at the flick of a switch.

MAIL COUPON FOR FULL DETAILS

Wesfarmers Tutt Bryant Pty. Ltd.,
Railway Avenue, Bassendean.
Please send me details of the BIG Lincwelder 250BT without obligation.

NAME.....

ADDRESS.....

.....

If required for school project, tick here ☐

WFB Wesfarmers Tutt Bryant PTY. LTD.

RAILWAY AVE. BASSENDEAN. PHONE BX1616

BINDWEED

(*Convolvulus arvensis* L.)

This quite attractive plant is a very troublesome weed in Europe and North America. It occurs in a few localities in Western Australia but nowhere has become widely established. Experiences in other countries having similar conditions, however, have prompted its declaration as a primary noxious weed.

WEEDS of Western Australia

By **G.R.W. MEADLY** M. Sc.
Officer in Charge, Weeds and Seeds Branch

BINDWEED
(Convolvulus arvensis L.)

BINDWEED is native to Europe, but is now found is most temperate countries. In England it is recorded as occurring in cornfields and waste places on almost all soils, especially those of a medium or sandy nature. It is found throughout Canada with the possible exception of two Provinces, being particularly troublesome in the Southern Prairies and the longer-settled areas of Ontario and Quebec.

Bindweed, was first reported in the United States in 1739 when plants were found in Virginia. By 1900 it had spread throughout the country except in the south-eastern region where the climate is unfavourable. It is considered among the worst of the weed pests in the western States. Since being first recorded in New Zealand in 1870, it has spread widely in both Islands, occurring in fields and waste places.

As one would expect, bindweed has become established in a large number of localities in the southern half of Australia. Although probably one of the later of our weed introductions, it occurred in many places by the beginning of this century and was declared a noxious weed in Victoria in 1908. First recorded in New South Wales about 1889 it is now common in the southern localities and has also spread to other parts of that State. It is widespread throughout the agricultural areas of both Tasmania and South Australia, occurring in vineyards, orchards and gardens as well as on land used for cereals. It has been found in a few places in Western Australia but no large infestations are known. Experiences in other countries having similar conditions, however, have prompted its declaration as a primary noxious weed.

DESCRIPTION

A perennial with a deep and extensive root system, it spreads by means of seeds and also by shoot buds produced on the roots, which are cordlike and fleshy. The fine stems, sometimes ten feet long, are either prostrate or twining around some support such as other plants. The stalked leaves are very variable in shape and size, the base having two sharp or rounded lobes. The pink or white funnel-shaped flowers, one inch or less across, may be solitary or in groups of two to four. The long flowering stems have two small bracts some distance below the flowers.

The seed pods, about $\frac{1}{8}$in. across, contain one to four seeds each somewhat more than $\frac{1}{8}$in. long. These are dull grey, pear-shaped in outline with one side rounded and the other with a rounded central ridge. The surface is roughened with greyish worts and the prominent basal scar is reddish in colour.

Convolvulus, meaning to roll round or entwine, alludes to the characteristic twining habit of this group of plants, while *arvensis* means field. Besides bindweed and field bindweed other common names applied to this plant include small-flowered convolvulus, wild morning glory, creeping jenny, bell bind and cow bind.

BINDWEED *(Convolvulus arvensis* L.)

A—Showing the twining habit of the plant and also the root system; B—Seed about natural size and magnified. (From Weeds of Canada.)

SIGNIFICANCE

Bindweed has all the undesirable characteristics of a vigorous perennial weed with the exception that it is not regarded as being toxic. It trails along the ground, over and among low growing crops, robbing them of those essentials for growth—food, moisture, light and air. The weight of the climbing stems can pull down cereal crops, thus hampering harvesting operations as well as reducing yields.

Although eaten by stock it cannot be considered to have forage value.

CONTROL

The destruction of bindweed is very difficult. There is ample evidence that the seeds retain their viability for many years. Seeds taken from a specimen collected 50 years previously germinated to the extent of 62 per cent. while seedlings continue to appear for a number of years after a plant has seeded.

As with many other perennials, including sorrel, small portions of root are capable of producing new plants and working through a patch of bindweed, particularly with a tyned implement, will spread the weed. Although extensive work has been undertaken with this weed in many parts of the world, no very effective control measure has been evolved. Some degree of success has been achieved with cultivation, growing competitive plants and the application of chemicals. With trials undertaken in Iowa, before eradication was complete, it was necessary to cultivate a heavily infested area every ten days between June and October for a period of four years. Most of the weed had disappeared after workings during two growing seasons.

In Minnesota bindweed has been controlled after several years by a series of cultivations followed by the sowing of a competitive crop such as soyabeans, sorghum or sudan grass. Minnesota experience has also shown that controlled grazing with sheep is helpful. Infested land was planted to rye or wheat in the autumn and sudan grass in the spring. Sheep grazed the bindweed along with the sown crops and after two to three years the weed was reduced to small proportions.

In England short rotations with extra root crops and persistent thorough hoeing are practised to exhaust the root system of food reserves and prevent seeding. It is obvious that any cultural or competitive methods calls for thoroughness and perserverance. The same may be said concerning chemicals, but for small infestations in particular they can be used effectively. Repeated applications of a 10 per cent. solution of sodium chlorate have given good results but 2,4-D ester is the most economical and satisfactory chemical. Complete eradication is difficult but repeated applications give a high degree of control and this method can be used in conjunction with many cropping practices. One pound of acid equivalent per acre gives good results and the bud or early flowering stage appears to be the most appropriate time for application.

FREE SERVICE TO FARMERS

Do you know that the Department of Agriculture provides a comprehensive service of advice and technical assistance to farmers, free of charge?

When in need of advice, get in touch with your District Officer whose name and headquarters township will be found in the list of Departmental personnel on Pages 502 and 503.

These officers are there to help you and will make personal visits to your property to assist with on-the-spot advice. In addition, they will, where necessary, arrange for the services of specialist officers—all without cost to you.

WORLD-FAMOUS FOR QUALITY, SERVICE AND ECONOMY . . .

ELECTROLUX

in a range of sizes to suit everyone!

ELECTROLUX MODEL LT731—KEROSENE
A full 7.3 cu. ft. capacity, handsome, big-size features, brilliant, practical beauty make the Electrolux LT731 the perfect choice for the larger family. Full-width frozen-storage compartment, handy door shelves, clear-view vitalizers, four easy-release freezing trays, plus the ever-silent freezing unit guaranteed for 5 years. £172/10/-.

ELECTROLUX MODEL LT501—KEROSENE
Here is the size you've waited for—5 cubic feet of famous Electrolux refrigeration, the perfect "average family" size. Gives ample cold storage for your whole week, full-width across-top freezer, door shelves, vitalizer, chill tray, the world-famous Electrolux freezing unit backed by a 5-year guarantee. £137/10/-.

ELECTROLUX MODEL LT314—KEROSENE OR ELECTRIC
For the smaller family, this 3.1 cu. ft. model gives a lifetime of big performance, maximum storage. Door shelves, upright bottle storage, freezing trays, 5-year guaranteed freezing unit. £105.

ELECTROLUX MODEL LT171—KEROSENE OR ELECTRIC
A brilliant 1.7 cu. ft. with big-model features for flats, offices, caravans, week-enders. Upright bottle storage, latest door racks, freezing unit guaranteed for 5 years. £75.

(All prices slightly higher in country areas)

DISTRIBUTORS:

Dalgety AND COMPANY LIMITED
(Incorporated in England)

★ Electrolux refrigerators are available from Dalgety's or their local dealer in your district

WHEAT AND BARLEY TRIALS 1956-57

BY

F. L. SHIER, B.Sc. (Agric.),
SUPERINTENDENT OF WHEAT FARMING

AND

J. T. REEVES, B.Sc. (Agric.),
PLANT GENETICIST

THE results of cereal variety trials on wheatbelt research stations and also a barley trial on the property of Messrs. Hamilton Bros., Moora, are included in two separate articles in this Journal. Trials with wheat and barley are discussed in this article, while the oat variety trials have been incorporated into "Oat Trials and Usage in the Wheatbelt, 1956." (See page 551.)

Two new wheats were under test for the first time; viz., Koda, bred by the University of Sydney and W.35 a fixed cross-bred developed at the Wongan Hills Research Station.

SEASONAL CONDITIONS, 1956-57

Rainfall figures for the research stations are shown in Table 1. Merredin is not included, as the experiments were destroyed by hail storms in November.

Good opening rains were received in May at all stations except Salmon Gums, where the recording was below average. This satisfactory start of the season, together with fine weather in June, enabled cropping to be completed on time. The fine weather was accompanied by low temperatures, but the effects on plant growth were not particularly detrimental.

Satisfactory falls continued until the end of July but from then on, extremely dry conditions prevailed, with rainfall in August and September well below average. Light rains in October were of considerable benefit and assured an average finish to the season, except at Salmon Gums, where the rains came too late to be of any value.

Crops were sown on unfallowed clover ley land at Avondale, Chapman, Esperance and Wongan Hills. At Salmon Gums the land was fallowed in 1955, while at

TABLE 1.

Rainfall at Research Stations.

Station.	Growing Period.									Annual Total.
	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Total.	
Avondale, 1956	20	63	312	346	352	24	61	45	1140	1252
Average 30 years	75	89	219	315	297	221	102	79	1234	1561
Chapman, 1956	84	30	436	394	451	70	25	70	1446	1620
Average 51 years	62	78	239	404	388	258	138	90	1516	1785
Esperance, 1956	9	116	190	261	228	136	125	104	1044	1276
Average 7 years	50	134	250	238	202	212	245	163	1310	1815
Newdegate, 1956	45	93	218	187	188	33	72	36	734	989
Average 2 years	49	192	162	141	145	175	172	94	890	1535
Salmon Gums, 1956	7	106	87	143	141	28	68	86	553	728
Average 31 years	121	91	126	150	140	141	106	110	773	1314
Wongan Hills, 1956	29	22	403	333	370	31	59	60	1256	1429
Average 31 years	84	91	196	254	260	194	91	69	1064	1404

Newdegate, the trials were sown on new land which had been under fallow for two seasons.

Seasonal conditions and cultural operations on the individual stations were as follows—

AVONDALE RESEARCH STATION, BEVERLEY

The experimental site was first sown to subterranean clover in 1952. It was scarified in the third week in May, 1956, and followed a few days later with a disc ploughing. The trials were sown with 60 lb. seed and 112 lb. superphosphate per acre. Initial growth was slow under the cold conditions and with a dry August, weeds tended to gain a hold. However, the plots made good recovery in September and October and satisfactory yields were obtained.

CHAPMAN RESEARCH STATION, NABAWA

The experiments were sown on land which had been under subterranean clover and Wimmera ryegrass pasture since 1943. The initial ploughing was with a sundercut in May, 1956, followed by tyne cultivation to control weeds before the first trial was planted in mid-May with a spring tyne combine. The trials were sown with 60 lb. seed and 80 lb. superphosphate per acre.

ESPERANCE PLAINS RESEARCH STATION, GIBSON

The trial was planted on ley land which had been under clover since 1952. The area was ploughed twice in May, then seeded with a disc-harrows drill combination. The seeding rate was 60 lb. per acre with 50 lb. of superphosphate (the area having been topdressed prior to cultivation with 150 lb). The early rains were below average but good falls in August and September resulted in a satisfactory average yield of 17.0 bushels per acre.

NEWDEGATE DEMONSTRATION FARM, NEWDEGATE

The sowing rate for the wheat trials was 45 lb. with 190 lb. per acre super-copper-zinc mixture, and for the barley trial the rates were 50 and 200 lb., respectively. Despite the dry finish to the season, satisfactory yields were obtained.

SALMON GUMS RESEARCH STATION, SALMON GUMS

The trials were sown on land which had been fallowed in July, 1955, scarified in October and again in April, 1956, to control weeds. The wheat trials were planted with a combine, 45 lb. of seed and 90 lb. of superphosphate per acre being applied. Dry conditions, particularly in August and September, produced thin, short crops with drought-tipped heads. The late-planted wheat trial was particularly affected by these conditions and no useful results were obtained.

WONGAN HILLS RESEARCH STATION, WONGAN HILLS

The trials were sown on land which had been established to clover pasture in 1951. The site was disc ploughed in the first week in May, and cultivated a fortnight later with disc harrows and a one-way discer. The wheat was sown at 45 lb. per acre with 112 lb. of superphosphate. The cold, wet conditions retarded crop growth until September but later, beneficial falls finished the grain well and above average yields were obtained, the early planted trial averaging 27.8 bushels per acre.

WHEAT VARIETY TRIALS

The yields are presented in Table 2. These are expressed both in bushels and as percentages of Bencubbin 48 and Wongoondy, the control varieties respectively, in the early and late planted trials.

The varieties under trial fall into three maturity groups, late-midseason, midseason and early. The late-midseason group should be planted first and those in the early group last. If the latter are planted too early, disease such as Septoria and excessive shedding by wind on overtall and rank crops are likely to occur.

Late-midseason Maturity.

Celebration, Kondut and Panther.

Midseason Maturity.

Bencubbin 48, Eureka 2, Sabre, M.114.

TABLE 2.

Wheat Variety Trials at Research Stations, 1956-57 Season.

Variety.	Avondale.			Chapman.			Newdegate.			Salmon Gums.			Wongan Hills.			Esperance.		
	Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.	
		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.
Midseason Maturing Varieties—																		
Bencubbin 48	20·9	100	(6) 100	16·5	100	(6) 100	13·5	100	..	5·4	100	(5) 100	28·7	100	(5) 100	14·3	100	(5) 100
Kondut	20·8	99	(6) 110	17·5	106	(6) 112	14·4	107	....	....	....	....	29·2	102	(5) 105	....	....	....
Eureka	21·2	101	(6) 115	18·1	110	(6) 112	13·7	102	..	5·0	92	(5) 104	28·3	98	(5) 105	20·2	141	(4) 115
Sabre	21·3	102	(3) 110	17·5	106	(3) 112	13·9	104	..	4·7	88	(2) 98	25·9	90	(3) 93	18·4	129	(3) 108
M. 114	20·1	96	(2) 105	16·6	101	(2) 103	....	....	....	5·3	99	(2) 92	26·7	93	(2) 98	....	....	....
Celebration	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	15·5	108	(2) 107
Panther....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	16·7	117	(5) 106
Diff. for sig. P = ·05	Not significant.			0·7	4	....	0·7	5	....	Not significant.			0·8	3	....	1·1	8	....
Early Maturing Varieties—																		
Wongoondy	22·2	100	(10) 100	20·8	100	(9) 100	17·5	100	....	....	....	....	22·6	100	(10) 100	..	..	....
Gabo '....	20·9	94	(10) 105	20·0	96	(9) 102	16·2	93	....	....	....	....	22·4	99	(10) 107	..	....	....
Insignia 49	23·6	106	(5) 113	23·1	111	(5) 113	16·0	91	....	....	....	....	21·8	96	(6) 110	..	..	....
Koda	19·7	89	....	18·4	88	....	14·2	81	....	....	....	....	18·2	81	...	.	.	....
W.33	19·6	88	(2) 97	17·7	85	(2) 98	14·8	85	....	....	....	....	18·6	82	(2) 88			..
W.34	20·9	94	....	20·2	97	....	15·9	90	....	....	....	....	22·7	101	(2) 91	.	.	..
W.35	22·5	101	....	19·5	94	....	15·7	89	....	....	....	....	22·5	100			..	....
Diff. for sig. P = ·05	1·6	7	....	0·9	4	....	1·1	6	....	....	....	....	1·1	5	....	....	....	....

N.B.—Figures in brackets indicate the number of years under trial.

Early Maturity.

Gabo, Insignia 49, Koda, Wongoondy, W.33, W.34, W.35.

Disease Resistance.

Flag-smut.—Gabo is susceptible and Insignia 49 is moderately resistant. The other varieties are either resistant or highly resistant.

Stem rust.—The strain of rust capable of attacking Eureka and Wongoondy, has not yet become established in this State and therefore these two varieties can still be regarded as resistant. The only rust strain isolated during the last few years is that known as 126 Anz. 1. All varieties (except Kondut) in the trials last season, are resistant to this rust strain.

Flour Quality.

Both Bencubbin 48 and Insignia 49 are of weak flour quality, the other varieties are either medium-strong or strong. Results obtained from variety trials and crop competitions indicate that in most areas of the wheatbelt, farmers can change over to the better quality wheats without any loss in yield. This change is taking place; the latest statistical returns show that 40 per cent of the total acreage is sown to varieties of improved flour quality.

Late-midseason and Midseason Varieties.

Kondut and Eureka gave satisfactory yields last season on the higher rainfall stations, also at Newdegate where the rainfall for the growing period was only 734 points. Eureka yielded well at Esperance whilst previous trials show it to be a very suitable variety for this area; Kondut is not recommended because of its susceptibility to stem rust. Both Sabre and Panther have also given good results at Esperance. Sabre, produced by Roseworthy College, also yielded well at Avondale and Chapman. As it has satisfactory disease resistance, good flour quality and straw strength, it is a variety which appears suitable for planting in the medium and high rainfall zones of the State where cropping on clover ley land is practised.

In the low rainfall areas, the highest yielding midseason varieties are Bencubbin 48 and Bencubbin. While Bencubbin 48 is no better than Bencubbin in flour quality, it is to be preferred because of its resistance to stem rust.

The crossbred M.114, did not yield particularly well last season at Avondale, Chapman and Wongan Hills, although previously under lower rainfall conditions, its yielding ability appeared satisfactory, suggesting that it may prove a useful variety to replace Bencubbin 48.

Early Maturing Varieties.

Over the last five years, Insignia 49 has been the highest yielding early variety in the research stations trials, but in 1956, this was only the case at Chapman. In the westerly districts, and where ley farming is practised, Gabo is to be preferred to Insignia 49. Although the average figures at Avondale suggest that it has outyielded Gabo by 8 per cent.—a direct comparison for the same five-year period shows that the difference is only a negligible half per cent. Further, Insignia 49 is a weak quality variety and consequently should be confined to the lower rainfall districts where the quicker finish to the season tends to result in grain of higher protein content.

Wongoondy continues to prove a very good early variety. Last season at Newdegate it outyielded all other varieties and, judged by previous trials at Merredin, it is more suitable than Gabo for the lower rainfall districts because of its greater drought resistance. Both Gabo and Wongoondy are medium strong varieties and on this account are to be preferred to Insignia 49.

Koda, a new variety from the Sydney University, gave yields inferior to the standard varieties at all stations. It appears to be unsuitable for local conditions.

The crossbreds W.33, W.34 and, W.35 produced at the Wongan Hills Station, were included in all the early trials but did not give any outstanding yield. W33 has been discarded and the other two will be included in the 1957 experiments.

The following table lists the varieties recommended for the different zones, taking into account yield data, flour quality tests, disease resistance and straw strength.

Bencubbin 48 and Insignia 49 are of weak flour quality, the others are medium-strong to strong.

TABLE 3.

Recommended Wheat Varieties.

Maturity.	Early Zone. Less than 14 in. annual rainfall.	Midseason Zone. 14 in. to 18 in. annual rainfall.	Late Zone. Above 18 in. annual rainfall.
Late-midseason	....	Kondut	Kondut
Midseason	Bencubbin 48	Eureka	Eureka
	....	Bencubbin 48	....
Early	Wongoondy	Gabo	Gabo
	Insignia 49	Wongoondy	Wongoondy
	....	Insignia 49	....

time. Further tests are necessary before any firm conclusion can be drawn.

M.119 is a hooded cross-bred, produced at Merredin from a cross between Greenough and Arabian Blue. As its yielding ability is low, it has now been discarded.

The two-row section included five varieties, Freja, Maja, Riegel, Ymer and Maltworthy in comparison with the local standard malt type—Prior. The first four are later maturing than Prior and only capable of high yields and good malting qualities in long seasoned districts. Malt-

TABLE 4.

Barley Variety Trials, 1956-57 Season.

Variety.	Avondale. Yield Bus./ Acre.	Avondale. Percent. of Control. 1956.	Avondale. Percent. of Control. Average.	Newdegate. Yield Bus./ Acre.	Newdegate. Percent. of Control. 1956.	Newdegate. Percent. of Control. Average.	Moora. Yield Bus./ Acre.	Moora. Percent. of Control. 1956.	Moora. Percent. of Control. Average.
Prior	22·9	100	100	15·3	100	100	14·0	100	100
Maltworthy	26·6	116	(4) 124	11·4	75	(2) 91	15·9	114	....
Beecher	30·6	134	(4) 137	16·2	106	(2) 111	22·3	159	(2) 125
Atlas	27·3	119	(4) 131	16·4	107	(2) 102	19·1	136	(2) 122
Atlas 46	25·0	109	....	16·5	108	....	....	....	....
M. 119	21·0	92	....	14·2	93	....	....	....	....
Freja	22·0	96	(4) 107	....	....	....	....	....	....
Maja	22·3	97	....	....	....	....	20·2	144	....
Riegel	21·1	92	(2) 80	....	....	....	19·1	137	....
Ymer	18·2	79	(2) 68	....	....	....	....	....	....
Diff. for sig. P = ·05	2·4	11	....	1·5	10	....	3·3	23	....

BARLEY VARIETY TRIALS

Last season, barley variety trials were carried out at Avondale, Newdegate and Moora, and the results are detailed in Table 4.

Of the six-row varieties, Beecher has continued to give higher yields than Atlas. Taking into account its better yielding ability, together with the fact that it is a white kernel variety, and consequently more acceptable to the Japanese trade which is now developing, Beecher is obviously a much better variety than Atlas for West Australian conditions.

Atlas 46—a back-cross variety, similar to Atlas, but resistant to powdery mildew —was included in the trials for the first

worthy, although better yielding, is being discarded and is not recommended because of local maltsters' preference for Prior.

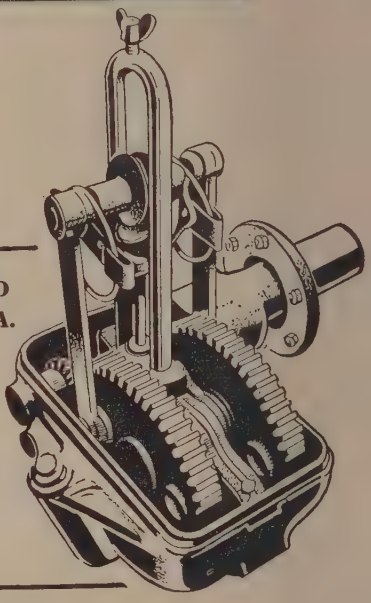
The recommended varieties are listed in the following table—

TABLE 5.

Recommended Barley Varieties.

Use.	Early Zone. Less than 14 in. annual rainfall.	Midseason Zone. 14 in. to 18 in. annual rainfall.	Late Zone. Over 18 in. annual rainfall.
Local Malting	....	Prior	Prior
6-row export	Beecher	Beecher	Beecher
Grazing and Fodder Grain	Atlas	Atlas	Atlas
	Beecher	Beecher	Beecher

THE NEW IMPROVED metters M windmill



ENTIRELY RE-DESIGNED
And Manufactured in W.A.

Gearbox is Weatherproof and Dirtproof

Larger Bearing Surfaces for Longer Life

- **PRECISION ENGINEERED**
- **BALANCED WHEEL**
- **NEW TYPE HUB**
- **STABILISED TAIL**
- **3 POINT FURLING**
- **POSITIVE OILING**
- **PUSH-IN BEARINGS**

Double gears are self aligning.
Hub is keyed and pressed to shaft.
All heads are complete with stub tower.
The M head can be fitted to existing towers.
On display at Country Agents.

metters

847-51 HAY ST., PERTH - BA 9461

MEMBER W.A. CHAMBER OF MANUFACTURES

Fig. 1.—Healthy scour-free calves like these are a valuable asset

CALF-HOOD SCOURS

By P. M. A. HARWOOD, M.R.C.V.S., Senior Veterinary Surgeon

OF all the operations carried out on a dairy farm, the raising of calves is often the most haphazard. This procedure represents a false economy. Calves nowadays are a valuable asset. Not only is it most desirable to have a good crop of healthy heifers coming along each year as replacements for the herd; high prices for vealers makes all calves valuable to the farmer.

Good rearing means healthy vealers and heifers; false economies and bad rearing practice lead inevitably to calf-hood scouring problems with a wastage that is larger than it appears at first glance. Deaths may not be frequent, but loss of carcass value in the case of vealers is considerable, while the check in growth to heifers may have a life-long effect in lowering production.

Calf-hood scours fall into three main categories (there is some inter-relationship) and all can be avoided by good husbandry.

SCOURS OF NUTRITIONAL ORIGIN

Vitamin A Deficiency.

The colostrum or first milk is a potent source of Vitamin A, and under normal conditions contains enough reserves to provide a calf for the first part of its life. **Under no circumstances should any calf be deprived of its own mother's colostrum during its first three days of life.**

Spring-reared calves which have received colostrum, and are then given access to good quality green pasture will obtain sufficient Vitamin A from these sources.

Calves born in late summer require Vitamin A supplements. Owing to lack of green grazing, the cow's colostrum is during this period at its relative lowest value of Vitamin A content. The calf therefore starts life with an inadequate reserve and is unable to add to it.

Green grass is the only natural source of Vitamin A for grazing animals. Cows can store sufficient reserves during the

green feed period to last them through the dry summer, but calves born in late summer have no such reserve.

Symptoms of Vitamin A Deficiency.

(i) Whitish scour.
(ii) Opacity and ulceration of the eyes.
(iii) Weakness and dry scaly skin.
(iv) Predisposition to pneumonia.

Prevention.

At all times feed colostrum and in late summer also feed Vitamin A supplements.

Treatment.

Feed Vitamin A supplements at double the preventive level. Response is rapid.

Overfeeding.

Overfeeding particularly after a period of starvation, often leads to scouring in calves. Calves left too long with high-producing cows are particularly liable to overfeed. Care in teaching calves to drink properly is a valuable preventive as properly taught calves do not get excessively hungry and have less tendency to gorge themselves when they do learn to drink.

During the first fortnight of life calves should receive 3 to 4 pints of milk twice daily.

Treatment.

When scouring results from overfeeding, give only boiled water for 24 hours then commence feeding on diluted milk (50 per cent. water for the first feed) the quantity of water being reduced at each successive feed.

Incorrect Feeding.

(a) Milk too Rich.

High butterfat milk is not a suitable food for rearing calves. 3.5 per cent, butterfat is the ideal level. Milk of 5 per cent. butterfat should be diluted at the rate of 4 pints of water per gallon.

(b) Skim Milk.

Skim milk alone is not a suitable food for rearing young calves. It should be supplemented with crushed oats or bran to make a balanced food.

(c) Incorrect Temperature.

Milk fed to young calves should be at blood heat. Milk fed too cold will cause scouring.

(d) Milk Substitutes.

Attention should be paid to the recommendations when feeding proprietary foods and dried skim milk, whey or dried buttermilk. In any event calves should receive whole milk for at least two weeks and the introduction to the substitute should be gradual. **Follow the maker's recommendations.** He has already experimented with his product.

(e) Depraved Appetite.

Calves have a tendency to eat string, old bags, straw and very coarse, fibrous grass. Make sure the calf paddock is free of such material, or digestive upsets are inevitable.

SCOURS OF BACTERIAL ORIGIN

Scouring of bacterial origin, the familiar white-scours or blood-scours is the greatest evil attendant on calf-rearing. Scouring of nutritional origin may often lead to white-scours and the condition is **highly infectious.**

White-scours is caused by the *coliform* bacillus and other related organisms. This germ is a normal inhabitant of the bowel, but under certain circumstances it becomes highly virulent, causing serious disease in the calf in which this change takes place and giving rise to a disease which spreads rapidly from calf to calf.

Symptoms of White-Scours.

(1) A profuse greyish white evil-smelling diarrhoea which has a particularly sticky tenacious nature. In severe cases this may become tinged with blood.

(2) Dehydration or withdrawal of fluids from the tissues. The calf rapidly becomes hide-bound and the eyes sink into their sockets.

(3) Weakness and prostration with death or slow lingering recovery with resultant stunting.

Prevention.

Depend on these principles:—

(1) Feed colostrum as this contains a fraction which immunises calves against the effects of White-scours.
(2) Avoid the conditions which may result in the *coliform* bacillus from becoming virulent (see section on scours of nutritional origin).

Fig. 2.—These calves, soiled and evil-smelling from continued scouring, are commencing life under a severe handicap

(3) Keep feeding vessels clean.
(4) Rear calves in clear uninfected paddocks.
(5) Isolate sick calves at once.

Treatment.

White-scours respond to several drugs. These are—

(1) Sulphaguanidine.
(2) Phthalyl Sulphathiazole.
(3) Sulphamezathine.
(4) Chloromycetin.
(5) Terramycin.
(6) Aureomycin.

Whichever drug is used there is always a likelihood of immune strains of white-scour-causing germs to develop. While treatment may be essential, remember that **prevention is better than cure** and the drug which worked last year may lose its effect next year. In any event, whichever drug is used, make sure each calf receives a full course of treatment.

PARASITIC SCOURS (WORMS)

Worms may be a serious problem to calf raising, particularly where the same calf paddock is used year after year. The ill-effects of worms are two-fold. They suck blood from the calf thereby weakening it and also cause irritation of the bowel and scouring.

The diarrhoea caused by worms is usually blackish or greenish in colour.

Symptoms of worms in Calves.

(1) Scouring (usually blackish in colour).
(2) Pot-belly and harsh, dead coat.
(3) Anaemia and weakness.

Prevention.

(1) Rotation and cultivation of calf paddocks.
(2) As adult cows are usually the original source of infestation, keep cows and cow-shed washings off the calf paddock.

Treatment.

By means of Phenothiazine, the dose rate being as follows:—

Calves 2-4 months—$\frac{1}{4}$-$\frac{1}{2}$ oz.
Calves 4-6 months—$\frac{1}{2}$-$\frac{3}{4}$ oz.
Calves 6-12 months—$\frac{3}{4}$-1$\frac{1}{2}$ oz.

Where calves are weak divide the dose into two and give on successive days.

Shortly after treatment put the calves into a clean paddock then repeat treatment in 2 to 3 weeks.

Worm infestation is most likely to occur in late winter and spring as it is at this period that climatic conditions suit the hatching of the worm eggs.

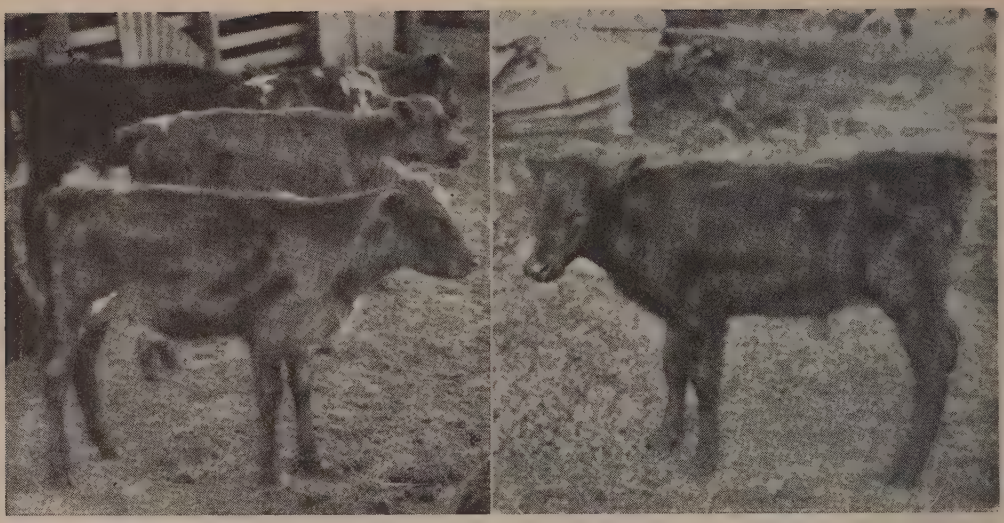


Fig. 3.—These worm-infested calves are debilitated by the parasites and the attendant scours

GENERAL POINTS IN CALF REARING MANAGEMENT

(1) Ensure that every calf has it own mother's colostrum for at least 3 days.

(2) Commence bucket-feeding as early as possible and take pains to ensure calves are taught to drink as soon as possible.

(3) Regularly sterilise feeding buckets.

(4) Prevent predisposition to White-scours by—

(a) Feeding milk in sensible quantities.

(b) Feeding at correct temperature.

(c) Breaking down very rich milk with water.

(d) Feeding whole milk for at least a fortnight.

(e) Effecting the change from milk to milk substitutes gradually.

(f) Using recommended rates of feeding with milk substitutes.

(5) In late summer give calves a Vitamin A substitute.

(6) Avoid straw and coarse fibrous grass. If green feed is not available use finest quality hay for feeding calves.

(7) Immediately isolate and treat scouring calves.

THE CALF PADDOCK

Follow these principles.

(1) Ample size.

(2) Aim at a short nutritious green pick.

(3) Shelter from cold winds and rain.

(4) Feeding bails to ensure each calf gets the correct quantity of milk.

(5) Good fencing to keep calves in and adult cows out. **Do not run calves in the bull pen.** He may be the source of worm infestation.

(6) Good drainage with no wash from cowshed or pig pens. (Pigs may transmit a serious disease red-water (*Leptospirosis*) to calves).

(7) Regular rotation with cultivation so that calves are not run on the same ground every year. Deep ploughing of the old paddock will help bury worm eggs and disease-causing germs.

SUMMARY

(1) Calves represent a valuable asset—as cash for vealers and as the future milking herd.

(2) A serious check in calf-hood may permanently affect the productive capacity of an animal throughout its life.

(3) Healthy calves can only be reared where attention is paid to good husbandry practice.

Oat Trials and Usage in the Wheatbelt, 1956

By

A. S. WILD, B.Sc. (Agric.), Assistant Superintendent of Wheat Farming

and

J. T. REEVES, B.Sc. (Agric.), Plant Geneticist

THE increasing acreages planted to oats in the Western Australian wheat growing districts have been associated with the improvement of farms for the carrying of stock and the need for a convenient change crop from wheat. Production of coarse grains, both oats and barley, has substantially increased the total area of cereals grown annually in Western Australia since 1930.

In the early years of development of a wheat farm or district, oats usually play but a minor part and even up to 1930, the area planted to this cereal, for all purposes throughout the State, was only 550,000 acres or 13 per cent. of that sown to wheat. By 1955-56 the total acreage of oats had increased to 1,782,000 of which 1,091,000 were harvested for grain, 133,000 for hay, and the remaining 558,000 utilised for green feed. In this year the total acreage of oats was 60 per cent. of that for wheat. Much of the increase has occurred over the 10 years since 1945-46, when the total area was 738,000 acres.

The extension of bulk handling facilities to provide for the receival of oats and barley in bulk, has been an important factor in the expansion, over the past decade, of the oat acreages sown for grain. Allied with this has been the development of an overseas export trade in oaten grain, shipments being made almost wholly in bulk. Western Australian oats are of high quality and command a premium on the overseas market. The major constituent of the oats exported consists of the variety, Ballidu, which is particularly suitable for the requirements of European oat millers.

The extension of oat-growing into the drier areas of the wheatbelt has necessitated the development of early-maturing varieties suitable to the less favourable climatic conditions. Oats have provided a convenient association with wheat production. The cropping and harvesting programmes can provide for both of these cereals. Oats for fodder can be planted in advance of the main seeding, with less danger of malting and the operation of harvesting can be completed before the main wheat crop is mature. Both can be planted and harvested with the same set of machinery. Oats are resistant to takeall and similar wheat diseases and therefore can be usefully included in a wheat-growing rotation as a measure of control, especially in conjunction with a fallow period. Some measure of control of webworm can also be achieved by growing oats on grassland which has been ploughed up for immediate cropping.

Oats have nutritional requirements similar to those of the two other common cereals—wheat and barley, but nevertheless, when utilised by stock on the farm,

contribute substantially to the maintenance and increase of soil fertility and improvement of its physical condition as the organic matter is returned to the soil.

UTILISATION

Sown Specially for Grazing.

The larger portion of the crop for this purpose is sown on wheat stubble land which is broken up with the first autumn rains. These crops provide a green "bite" in the earlier part of the season and in about five to six weeks from germination often carry five to ten sheep per acre for a period of 10 to 14 days. They may be grazed outright, or left to recover for grain. Besides providing a bulk of green feed earlier than natural pastures, their utilisation in the early part of the season allows the natural pastures to make a body of feed before they need to be fed off. This tends to prevent selective grazing of the young pasture plants with the possible elimination of desirable types which are more palatable in their early growth stages. Oats also provide an excellent cover grazing crop in the first year of establishment of subterranean clover and other pastures. Cereal crops grown for early green feed are invaluable to fat lamb producers, and the same crop can be used for topping off lambs in the spring when grass seeds are a nuisance.

Sown for Hay.

The almost complete change over to mechanised power farming has resulted in reduction of the area cut annually for hay. High labour requirements have possibly contributed also, but with the greater use of hay balers and other equipment, and the farmer's appreciation of the necesssity for adequate hay supplies for his stock, the area cut is likely to increase rather than decrease in the future. Over the past ten years, the acreage has been relatively stable, although during the last five years, there has been an upward trend.

The time of cutting cereal hay has a marked effect on both maximum yield and total digestible nutrients. The maximum yields of total digestible nutrients are obtained by cutting wheaten hay at the late "milk" stage and oaten hay at the early "dough" stage of grain formation. These times of cutting correspond with time of maximum total yield of hay.

Sown for Grain.

Results and comparisons of hay and grain yields give support to the conservation of cereal hay rather than grain. However, the total yields of dry matter are not the only consideration, and cereal hay is a roughage of comparatively low digestibility and a very low content of digestible protein. Grain, on the other hand, is a concentrate, particularly well adapted for supplementing the poor dry grazing of the summer months, and moreover, its digestible protein content is much higher than that of hay, and at this time of the year, a protein deficiency is probably the most important limiting factor in sheep husbandry.

Oat grain has the advantage over wheat in that, due to its physical condition, it is more suited to bulk storage over long periods than wheat. Whereas wheat has to be regularly turned over and aerated when in extended storage, oat grain can be left for years. It is also less liable to weevil attacks than is wheat. Disadvantages with oats are that they generally shed their grain more readily than wheat and also they are liable to lodging under unfavourable seasonable conditions.

SOIL PREPARATION

Although oats may do better than wheat with less careful soil preparation nevertheless, the better the soil preparation the better the crop. Oat crops which are intended to be cut for hay or harvested for grain should be planted under good conditions, either on fallow or land which has been improved by a period under clover pasture. On the latter, yields would be increased if planting is delayed for up to two weeks after the initial ploughing. When sown for early green feed, the more common practice is to sow them on the previous year's wheat stubble following upon the first appreciable autumn rains. This practice allows of early sowing on a fairly good seed bed with a reasonable degree of weed control.

The purpose for which the crop is grown will, to a large extent, determine the seeding rate, but generally 40 lb. per acre is

recommended when the crop is to be grazed completely. When recovery is desired, this rate may be increased to 60 or 70 lb. per acre. The actual seeding rate will, however, vary with the purpose of the crop, time of sowing, district, and the stooling habit of the particular variety sown. When sown as a cover crop in the establishment of pastures, 20 lb of seed is recommended.

With regard to fertiliser requirements, if sown on fallow, the usual rates as for wheat should be adopted. When planted on stubble land as a catch-crop, the normal rate of application could be reduced. However, having regard to previous applications, it is not recommended that the rate be less than 56 lb. per acre, particularly for light soil types.

VARIETIES

The principal oat varieties grown in Western Australia are classified according to the following maturity groups.

Very Early: Wongan.

Early: Ballidu, Fulghum, Kent, Mulga, Orient.

Midseason: Avon, Dale, Guyra.

Late: Algerian.

Fulghum is slightly later than the other early maturing varieties and is sometimes classified as being of early midseason maturity.

The areas sown to the main oat varieties for all purposes during 1955-56 and the two preceding seasons are shown in Table 1.

TABLE 1.

Acreages Sown to Oat Varieties for All Purposes.

Variety.	1953–54.		1954–55.		1955–56.	
	Acres.	Order.	Acres.	Order.	Acres.	Order.
Ballidu	815,286	1	1,013,111	1	1,215,996	1
Wongan	152,691	2	197,215	2	225,367	2
Dale	111,309	3	126,047	3	128,572	3
Algerian	64,922	4	59,121	4	58,413	4
Fulghum	42,058	5	47,885	5	45,877	5
Guyra	35,357	6	31,919	6	32,377	6
Mulga	25,801	7	28,760	7	28,122	7
Orient	4,679	11	7,074	9	12,420	8
Other Varieties	32,069	....	37,890	....	44,403	....
Totals	1,284,172	....	1,549,022	....	1,781,547	

Experimental work within recent years has shown that on light soils optimum cereal grain yields are not often obtained without the use of trace elements such as copper and zinc. With oats, zinc is of more importance than copper but when oats are sown on new light land, it is generally advantageous to apply the super-copper-zinc fertiliser with the first crop at a rate of not less than 150 lb., but preferably at a bag to the acre.

The ideal sample for seeding is a well threshed and well cleaned plump grain, and the seed should be dusted with one of the proprietary mercurial dusts for the prevention of both loose and covered smut.

The increased area sown to Ballidu, the leading oat variety has almost equalled the whole of the increase in oat plantings in this State over the past eight years.

VARIETY TRIALS

The variety trials conducted at the research stations each season provide information which assists in determining the most suitable oat varieties for growing under different soil and climatic conditions.

GRAIN PRODUCTION

The grain yields from the 1956-57 season's trials are presented in Table 2. Due to the small number of varieties

TABLE 2.

Oat Variety Trials at Research Stations 1956-57 Season.

Variety.	Avondale.			Chapman.			Merredin.			Salmon Gums.			Wongan Hills.			Esperance.		
	Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.		Yield. Bus./ Acre.	Percent. of Control.	
		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.		1956.	Average.
Early Planted Trials—																		
Avon	44·4	128	(4) 131	25·5	112	(3) 116	....	....	....	3·8	229	(2) 116	34·2	114	(4) 116	26·5	119	....
Dale	34·7	100	(4) 100	22·8	100	(3) 100	....	....	....	1·7	100	(4) 100	30·1	100	(4) 100	22·2	100	100
Fulmark	37·5	108	....	21·6	95	....	....	....	....	1·6	95	....	29·6	98	....	....	....	....
Algerian	29·2	84	(4) 85	....	....	....	....	....	....	2·3	138	(4) 96	27·6	92	(4) 88	17·5	79	(5) 93
Ballidu	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	25·3	114	....
Kent	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	21·5	97	....
Diff. for Sig. P = ·05	3·0	9	....	N.R.	N.R.	....	....	....	....	0·6	34	....	2·2	7	....	N.R.	N.R.	....
Late Planted Trials—																		
Alpha	....	....	....	22·0	80	....	9·0	78	....	6·7	135	....	23·8	97	....	....	....	....
Ballidu	....	....	....	27·5	100	(5) 100	11·5	100	(5) 100	5·0	100	(4) 100	24·5	100	(4) 100	....	....	....
Kent	....	....	....	29·9	109	(5) 100	13·9	120	(5) 102	6·2	126	(4) 109	23·0	94	(4) 89	....	....	....

N.R.—Not Randomized.

under test, some of the trials were not randomised and in these trials differences for significance cannot be given. Varieties included in these trials are briefly described:—

Late Maturing.

Algerian.—Although the yield from this variety has been less than that from the new variety Avon, it is recommended, especially as a general purpose grazing and hay variety for the higher rainfall districts.

Midseason Maturing.

Avon.—This new variety has consistently given higher grain yields than any other midseason or late variety. It is similar to Dale in grazing capacity, but recovers better after grazing to give higher grain yields (see Tables 4 and 5.)

Dale.—The most widely grown midseason variety, it is a good general purpose oat, being suitable for both grain production and grazing in the medium to high rainfall areas of the wheatbelt.

Ballidu.—The most popular oat variety in this State. Ballidu has proved to be a good variety for sowing over a wide range of conditions. It can be sown for grain production or for green grazing and subsequent recovery for grain. The grain is most suitable for the export market.

Kent.—This new variety, bred at the Wongan Hills Research Station, has a vigorous early-growth habit and is therefore particularly valuable for grazing early in the season when pastures are just commencing growth (see Table 4). Grain yields are similar to those obtained from Ballidu.

HAY PRODUCTION

At Avondale, Merredin and Wongan Hills, trials were conducted to compare the hay yields of the new varieties Avon and Kent, with the older varieties. Cutting was carried out at the early "dough" stage which corresponds with the time of maximum total yield of hay and maximum yield of total digestible nutrients.

Cured weights from the 1956/57 trials are shown in Table 3.

TABLE 3.
Hay Yields in Cwts. Per Acre.

Variety.	Avondale.		Merredin.		Wongan Hills.	
Early Planted Trials—	Cwts./Ac.	%	Cwts./Ac.	%	Cwts./Ac.	%
Algerian	65·0	94	....	....	21·4	99
Avon	61·5	89	21·0	104	20·8	97
Dale....	69·2	100	20·2	100	21·6	100
Late Planted Trials—						
Ballidu	45·7	100	14·2	100	15·8	100
Kent	61·0	134	14·1	99	15·6	99

Fulmark.—A variety recently released by the New South Wales Department of Agriculture. It gave promising yields, particularly at Avondale. Its grazing capacity has not yet been tested under local conditions.

Early Maturing.

Alpha.—This new Victorian variety shed its grain excessively and therefore, low yields were obtained at Chapman and Merredin. It is particularly vigorous in early growth.

Hay yields for Avon were approximately equal to those from Dale, except at Avondale where the yield was inferior. With the two early-maturing varieties, yields were similar at Merredin and Wongan Hills, but those for Kent were much higher than for Ballidu at Avondale. It should also be noted that the midseason varieties gave greater production than the early varieties; this may have been due to seasonal conditions or to the longer growing period required by the later maturing oats.

GRAZING AND RECOVERY FOR GRAIN

The subject of grazing has been dealt with in previous issues of this Journal (2) and may be summarised:—

(1) Oats should not be grazed beyond the date when the critical change in growth occurs, i.e., when the plants change from the vegetative or grassy to the reproductive or stemmy stage. Grain yields will be seriouly reduced if grazing is carried out when the plants are in the stemmy stage.

(2) When feeding off the crop, it is essential that each grazing should occupy only a short period with a large flock of sheep, as this prevents selective grazing.

(3) Sheep should not be turned into the paddock when it is in a very wet condition, as pugging of the soil may result in poor recovery after grazing.

(4) Crops intended for grain should not be grazed if maximum yields are required. However, grazing rapidly over a very short period, and while the plants are in the grassy stage, allows the crop to recover satisfactorily for grain production.

Grazing Trials.

These are sown each season at Avondale, Merredin and Wongan Hills, and provide for no grazing; one grazing and two-grazing treatments. Grazing is carried out when the more vigorous varieties are from six to eight inches high. For the first grazing, this stage is usually reached in July, while the late grazing takes place towards the end of August. Sampling is carried out prior to grazing and, from the samples, the dry matter content is calculated for each variety.

Average dry matter yields in cwts. per acre and as a percentage of Ballidu, are included in Table 4. The number of years for which the results are averaged is four for Wongan Hills and three for the other two sites. Figures for the variety, Dale, at Wongan Hills have not been included as it was not in the trials for the full four-year period.

TABLE 4.
Dry matter Contents from Winter Grazings.

	Ballidu.		Kent.		Avon.		Dale.	
Avondale—	Cwts.	%	Cwts.	%	Cwts.	%	Cwts.	%
1st Grazing (July)	4·4	100	4·7	107	3·7	84	3·7	84
2nd Grazing (Aug.)	5·7	100	5·0	88	5·6	98	5·6	98
Total	10·1	100	9·7	96	9·3	92	9·3	92
Merredin—								
1st Grazing (July)	3·2	100	3·5	109	2·9	91	..	....
2nd Grazing (Aug.)	4·5	100	4·2	93	4·3	96	....	....
Total	7·7	100	7·7	100	7·2	94	..	..
Wongan Hills—								
1st Grazing (July)	3·4	100	3·7	109	3·2	94	....	....
2nd Grazing (Aug.)	3·4	100	3·4	100	3·2	94	....	....
Total	6·8	100	7·1	104	6·4	94	....	....

(1) The early-maturing varieties produced higher dry matter yields than the midseason varieties and therefore when grazing alone is required it is better to sow an early-maturing variety in the medium and low rainfall areas of the wheatbelt.

(2) Kent produced more feed when grazed early than did Ballidu, although total production from the two grazings was similar for each variety.

Average grain yields from the grazing treatments are expressed in bushels per acre and also as percentages of Ballidu are shown in Table 5.

TABLE 5.

Grain Yields from Grazing Trials.

	Ballidu.		Kent.		Avon.		Dale.	
Avondale—	Bus.	%	Bus.	%	Bus.	%	Bus.	%
No grazing	22·0	100	26·6	121	37·7	171	25·6	116
One grazing	20·4	100	20·1	98	28·4	139	20·2	99
Two grazings	6·9	100	7·8	113	11·5	167	6·9	100
Merredin—								
No grazing	26·1	100	27·5	105	27·5	105		
One grazing	17·7	100	19·9	112	28·2	159		
Two grazings	13·2	100	20·0	151	18·9	143		
Wongan Hills—								
No grazing	23·3	100	24·0	103	26·8	115		
One grazing	17·8	100	19·2	108	21·9	123		
Two grazings	9·6	100	11·1	116	14·0	146		

These figures show that oat varieties can be grazed once and still produce a worthwhile grain yield. A second grazing causes a further reduction in yield but could still be an economical overall proposition, including the feed value obtained..

Varieties planted in the grazing trials cannot be harvested so readily in their respective order of maturity. Under the climatic conditions at Avondale, more grain from the early-maturing variety Ballidu was lost from the non-grazed section and therefore the percentage yields are not comparable with those obtained from the variety trial at that Station.

RECOMMENDED VARIETIES

To assist in the selection of the most suitable varieties to grow, the wheat and sheep area of the State has been divided into three maturity zones based approximately on rainfall (see map). In the early-maturing zone, with less than 14 inch annual rainfall, cereal growing is the major occupation with sheep raising as a sideline. The midseason zone consists of those areas between the 14in and 18in isohyets where cereal and sheep are of equal importance. In the late zone, with over 18in. rainfall, improved pastures and stock raising are more important than the growing of cereals.

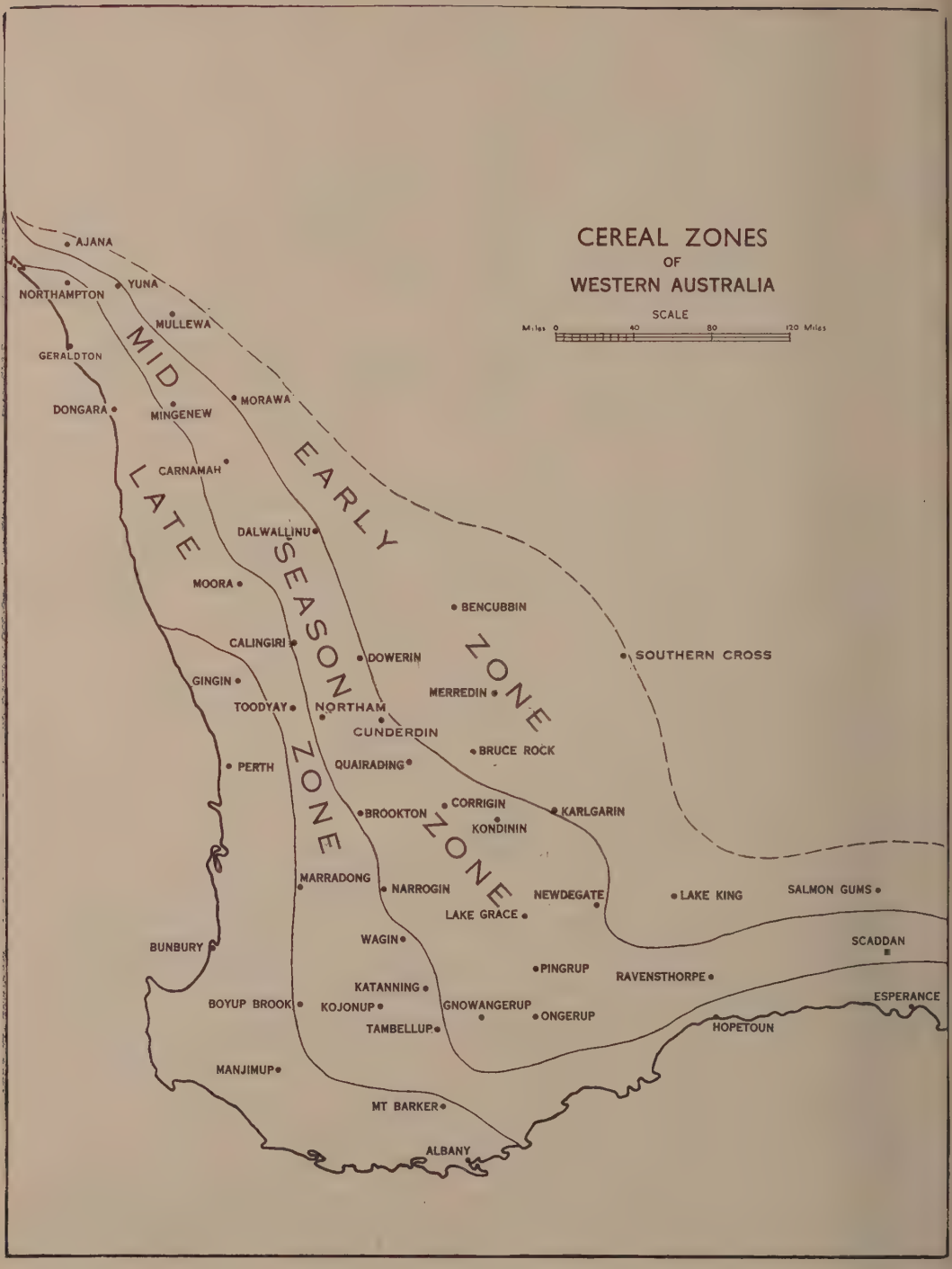
The following table lists the varieties recommended for each of the zones. In drawing up this list, grazing capacity, straw strength, grain yield and the suitability of the grain for the export market, have all been taken into account.

	Early Zone.	Mid-season Zone.	Late Zone.
Early sown	Dale Avon	Avon Dale	Avon Dale Algerian
Late sown	Ballidu Kent	Ballidu Kent	Ballidu Kent

Under normal conditions grazing crops should be planted in late April or early May. If intended for hay or grain, the late and midseason maturing varieties should be planted early in May, while the early maturing varieties should be sown from mid-May to mid-June for best results. Too early sowing of early maturing varieties produces rank, tall crops which have a greater tendency to lodge and/or shed grain.

THE EXPORT MARKET

The suitability of oats for the export market has recently been discussed in this Journal (3). Ballidu appears to be the most suitable for milling purposes as it normally produces a very clean rolled oat.


CEREAL ZONES
OF
WESTERN AUSTRALIA
SCALE
Miles 0 40 80 120 Miles
AJANA
NORTHAMPTON
YUNA
MULLEWA
GERALDTON
MID
EARLY
DONGARA
MINGENEW
MORAWA
CARNAMAH
LATE
SEASON
DALWALLINU
MOORA
ZONE
BENCUBBIN
CALINGIRI
DOWERIN
SOUTHERN CROSS
GINGIN
MERREDIN
TOODYAY
NORTHAM
CUNDERDIN
BRUCE ROCK
PERTH
QUAIRADING
ZONE
BROOKTON
CORRIGIN
KARLGARIN
KONDININ
ZONE
MARRADONG
NARROGIN
NEWDEGATE
LAKE KING
SALMON GUMS
LAKE GRACE
WAGIN
SCADDAN
BUNBURY
PINGRUP
RAVENSTHORPE
KATANNING
ESPERANCE
BOYUP BROOK
KOJONUP
GNOWANGERUP
ONGERUP
TAMBELLUP
HOPETOUN
MANJIMUP
MT BARKER
ALBANY

The other three varieties on the recommended list are also acceptable although not as popular as Ballidu. The midseason varieties have a tendency to produce light-weight grain when grown in a dry season or in the lower rainfall areas. This is particularly noticeable with Avon, which under these conditions, produces a grain with a low groats husk ratio, and as the groats only is required for milling, this means a lower percentage extract. Under higher rainfall conditions, Avon has given ratios as good as and sometimes better than for Ballidu.

REFERENCES

Reeves, J. T., "Oats and Barley Varieties in Western Australia." Jour. Agric., W.A., No. 3, 3rd Series, p. 453-461.

Thomas, I. and Watson, E. R., "Oats in the Wheatbelt." Jour. Agric., W.A., Vol. XXVI, 2nd. Series, p. 20-28.

Cariss, H. G., "The Utilisation of Cereals for Green Fodder." Jour, Agri., Vol. XXII, 2nd. Series p. 154-162.

Wild, A. S. and Reeves, J. T., "Oats and Barley for the Export Market." Jour. Agric., W.A., No. 4, 3rd Series, p. 593-596.

BREEDERS OF THE BEST!

FLUFFY CHIC Hatchery

PHONE ML574

320 G.E. HIGHWAY, REDCLIFFE

BOOK NOW - ALL AGES

SAVE 30%

by buying the 60 lb. drum of ALKA-KLENZ, the modern dairy detergent that cleans equipment effectively without damage to metal or rubber

Complies with B1 formulation of N. Zealand Dept. of Agriculture

ALKA-KLENZ and CITRA-KLENZ prevent milkstone build-up and remove all fatty residues completely. Easy to use—cost no more than older methods

Kill Weeds and Trees with **ARZEEN LIQUID** and **"VALLO" ARSENIC PENTOXIDE**—concentrated arsenical sprays

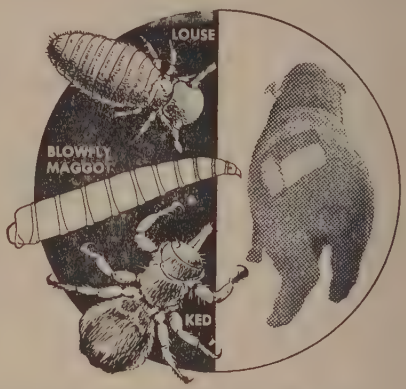
DISTRIBUTED IN W.A. by
SOUTH WEST CO-OP DAIRIES LTD.
Bunbury

WATSON'S FOODS PTY. LTD.
Hamilton Road, Spearwood

THE SPRAYS VALLO THAT PAY

VICTOR LEGGO & FARMERS LTD.
212 a'Beckett St., Melbourne

CONTROL THESE WOOL - CHEQUE BANDITS



WITH ONE EFFECTIVE DIP

Why lose a large slice of your potential wool clip to keds, lice and blowfly maggots? With just one highly efficient dip you can now control all three of these wool-cheque bandits. Use Sickle Brand "Aldrene" liquid sheep dip. It contains the new insecticide — Aldrin. With one dipping your sheep will have continuing protection from keds, lice AND blowfly strike for up to 8 weeks or even more. You save on freight and storage space as "Aldrene" is highly concentrated . . . one gallon makes up to 1600 gallons of dip. Mixes easily in hard or soft water . . . **there is nothing to add** . . . just pour and stir.

Don't lose money . . . use Sickle Brand "Aldrene" for your next dipping.

SICKLE BRAND

ALDRENE

Liquid Sheep Dip

In Quart Bottles & One Gallon Cans

Order now from your local agent or

WESTRALIAN FARMERS' CO-OPERATIVE LTD.
569 Wellington St., Perth. BA 0191

A1/30

Manufactured by Commonwealth Fertilisers & Chemicals Ltd., 65 William St., Melb.

Weight Trends In Fattening Cattle

Six Years' Trials at Wokalup Research Station — *continued*

By M. CULLITY, Superintendent of Dairying

PROJECT 4

Objective.

As a greater number of Hereford cross animals became available, more were included in the weighing groups, and as the grazing of summer irrigated pasture was possible for the first time, a comparison was made of:—

(1) Yearling and two-year-old Hereford cross steers on irrigated pasture.

(2) Yearling Hereford cross steers on irrigated pasture and similar cattle on unirrigated pasture.

(3) Yearling Hereford cross and yearling A.I.S. steers on unirrigated pasture.

Stock.

For this purpose, the following cattle were used:—

Group A.—23 1952 drop Hereford—dairy cross.

Group B.—18 1953 drop Hereford—dairy cross.

Group C.—18 1953 drop Hereford—dairy cross.

Group D.—14 1953 drop A.I.S.

Groups A. and B. were grazed during the summer months on good quality irrigated pasture, while groups C. and D. were on unirrigated paddocks. During the winter and spring months, all the cattle were grazed together. Both annual pastures and the winter and spring growth of the summer irrigated pasture were used.

Period.

The observations continued from February 11, 1954 to May 5, 1955.

Seasonal.

The usual dry summer was experienced in the early months of 1954. Germination of winter-type pastures took place towards the end of April. Rainfall was a little greater than average in May and lower than average in June. Although below average during the spring, falls occurred at times which enabled pastures to yield almost up to normal expectations.

The year 1955 was remarkable for abnormal rains in February which followed the movement of a cyclonic depression from the North-West of this State down the coast, before turning inland. A total of 6.12 inches was recorded for the month, compared with 0.88, 0.34, 1.68 and 0.05 inches in the years 1951 and 1954 respectively.

Apart from the unusually early germination of annual pastures, the perennial species made rapid growth. Of these, couch grass which thrives under conditions of heat and moisture, proved particularly valuable. The influence of this can be seen in the relatively good growth of cattle during the summer months, compared to other seasons. Although rainfall in March was negligible, falls in April were in time to carry on the pastures which had germinated and grown after the February falls. Pasture growth therefore was excellent.

Grazing.

As indicated above, the four groups for comparison were grazed as two groups. The details are as under:—

	Groups A and B.	Groups C and D.
Feb. 11-April 4	Irrigated pasture	Flats.
April 5-June 3	Irrigated pasture	Bull paddock.
June 4-June 14	Irrigated pasture	Bull paddock.
June 15-Nov. 18....	Fry's Hill	Fry's Hill.
Nov. 19-Dec. 22	Irrigated pasture + 6 lb. hay per day	Bull paddock.
Dec. 23-Feb. 10		Camp paddock.
Feb. 11-April 7	Irrigated pasture + 6 lb. hay per day	Bull paddock.
April 8-May 5	Irrigated pasture + 6 lb. hay per day	Camden's paddock.
May 6-July 7	Irrigated pasture + 6 lb. hay per day (Group B only)	Camden's paddock.

To avoid damage to pasture, the animals were moved to unirrigated land for from three to five days on the occasion of each irrigation which took place at three-weekly intervals.

Growth Rates and Trends.

Group A.—Twenty-three head Hereford dairy cross steers, 1952 drop. These animals were grazed on irrigated pasture during the summers of 1953/54 and 1954/55. The commencing weight on February 11, 1954, was 903 lb. They did not grow as rapidly as expected during that summer and autumn, probably because of a degree of overstocking. They were among 108 head of mixed ages which grazed on 33 acres from November to May. However, weights did increase to 948 lb. by May 6, but fell again to 922 lb. on June 3. From that date until May 5, 1955, they grew continuously and gained 493 lb., or an average of 1.4 lb. per beast per day, to a final weight of 1,415 lb. The rate of gain, however, in the period June 3, 1954 to January 13, 1955, was approximately 50 per cent. faster than from January 13 to May 5, 1.64 lb./day compared to 1.11 lb.

Group B.—Comprised 18 Hereford dairy cross steers, born in 1953. These also were kept on irrigated pasture during the two summer periods. Their average weight at commencement was 467 lb. They grew until the May weighing when they recorded 531 lb. In the next two months there was no change. From June 3, however, until May 5, 1955, growth was continuous, and the animals gained 544 lb. or 1.6 lb. per beast per day, the final weight being 1,073 lb.

Group C.—Eighteen Hereford dairy cross steers born in 1953. This group was similar to Group 2, but did not have access to irrigated pasture during the summer periods. The average weight on February 11, 1954, was 488 lb. By June 3, a small fall of 11 lb. per head was recorded. The highest weight (859 lb.) for this Group for the period under discussion, was obtained on April 7, 1955. This fell to 828 lb. at May 5. The animals in the 336 days from June 3, 1954 to May 5, 1955, gained 351 lb. or 1.0 lb. per day. This group was retained as Group A in Project 5, so weighing continued for another year.

Group D.—Fourteen pure bred Australian Illawarra Shorthorn steers born in 1953, bred at the Claremont Mental Hospital were transferred to the Wokalup Research Station when a few days old and hand-reared without whole milk. This group, like Group 3, did not have access to irrigated pasture. Their weight on February 11, 1954, was 302 lb. This increased during the months of March and April to 331 and 339 lb. respectively, but fell again to 317 lb. at June 3, and to 309 lb. at July 1. From June 3, 1954, to May 5, 1955, the animals gained 395 lb. to a level of 712 lb. at a rate of 1.17 lb. per day. The maximum weight however, was recorded at the weighing on April 7, 1955, when the animals averaged 738 lb. Weighing continued for another year as this Group was retained as Group B. of Project 5.

Discussion.

Although it had been decided that three years' collection of data under ordinary management conditions would be sufficient in Western Australia to give what might be considered a normal growth curve, the opportunity was taken with this project to continue the accumulation of data of that kind. Groups C. and D. kept on dry land throughout the summer provided this information. A study of the graph shows no difference in the growth trend from that of previous years.

Groups A. and B., the two-year-old and the yearling Hereford dairy cross steers which were grazed on irrigated pasture in the summer-time, showed a greater rate of gain than did those which were on dry land, but unexpectedly the rate of gain in the first summer was not as rapid as expected.

This relatively small growth rate while on good irrigated pasture may have been

due to an over-assessment of the carrying capacity of the paddocks.

From November of 1953 to May of 1954, 108 head of cattle were maintained on four paddocks totalling 33 acres, and although there appeared to be ample pasturage in each paddock and the cattle were not kept at any time on short pasture, in retrospect it appears probable that it was eaten below the level at which the animals could consume sufficient to maintain their bodies and to provide for an adequate gain in weight.

This contention is strengthened by the experience of the following year when the stocking concentration was not so great and growth rate was much faster.

There were interesting differences in the two summer periods in the rates of growth of the two groups. In the first period of 112 days (summer-autumn), i.e. to June 3, 1954, the two-year-olds gained 19 lb. compared to the younger group which grew 62 lb., the difference being very definitely in favour of the younger animals.

During the second period, i.e. from June 3, 1954 to January 13 1955 (winter, spring, early summer), growth rates were very similar, the larger cattle putting on 368 lb. while the younger put on 358 lb.

In the third period from January 13, 1955, to May 5, 1955 (summer-autumn) the older group put on 125 lb. while the younger one put on 186 lb.

Over the whole period of 448 days, the weight increases were 512 and 606 lb. respectively. During both summer periods the younger cattle gained more rapidly than the older. During the spring months when there was abundant fresh feed the larger cattle grew just as rapidly as the younger. Whether the better rate of growth for the latter in the summer months was due to their still growing bone and maybe also not having as great a gross requirement for feed as the larger ones, it is not possible to say. There is room, however, for speculation and further investigation.

Point is given to an earlier comment by virtue of the fact that the rate of gain during the second summer period was very much greater than that during the first period. The older cattle put on 19 lb. only in the first summer when the pastures were over-crowded and 125 lb. in the second summer. The younger cattle put on 62 lb. in the first summer on the over-crowded pasture and 186 lb. in the second summer when the stocking concentration was reduced.

The second comparision is made between Groups B. and C., Hereford dairy cross steers of the same age, one group being on irrigated pasture during the summer months and the other on dry land. The difference in growth during the period is substantial. As was indicated previously, the rate of growth of Group B. in the first summer was not as rapid as expected, and therefore the differences in the weights of Groups B. C. are not as great as anticipated.

However, during this period while the cattle on irrigated pasture put on 62 lb. those on dry land lost 11 lb. i.e. there was a relative gain in the case of the former of 73 lb. During the second summer, i.e. in early 1955, the irrigated group gained 186 lb. compared with 53 lb. in the case of those on dry pasture. The advantage in favour of the group on irrigated pasture was 133 lb.

The movement in weight of Groups C. and D. during the summer of 1954/55 on dry pasture was not parallel to that of cattle in other projects on the same paddocks during similar periods. This undoubtedly was due to the heavy rains which occurred in February of that year, and which promoted a strong growth of couch grass, subterranean clover and rye grass on several paddocks. This unusual growth also led to the cattle being kept for a greater proportion of their time on these paddocks.

If it is assumed that the 133 lb. liveweight gain gave only a 70 lb. increase in carcass weight, and that increase were assessed at a value of 2s. per lb., it would be an extra return of £7 per beast. The stocking concentration on these paddocks is about two per acre, and this means therefore that the additional return is equivalent to £14 per acre over the same period. Therefore, the difference of 133 lb. was considered profitable.

The third comparison is between yearling Hereford dairy cross and A.I.S. steers

kept on unirrigated pasture during the summer months.

For the full period of the project the A.I.S. animals put on 70 lb. weight more than the Hereford crosses: 410 lb. to 340 lb. respectively.

During the first summer or static period the Hereford crosses lost 11 lb. while the A.I.S. put on 15 lb. In the "growing" period June 3, 1954 to January 13, 1955, the A.I.S. gained 342 lb. while the others recorded 298 lb. only. In the second summer or

PROJECT 4

73 Hereford dairy cross and A.I.S. steers on irrigated and unirrigated pastures

LEGEND

Group A 23 Two year old Hereford dairy cross steers on irrigated pasture in summer

B 18 Yearling Hereford dairy cross steers on irrigated pasture in summer

C 18 Yearling Hereford dairy cross steers on dry pasture in summer 1953

D 14 A.I.S. steers on dry pasture in summer 1953

PROJECT 5

110 Hereford dairy cross Aberdeen Angus dairy cross and A.I.S. steers on irrigated pasture in summer

LEGEND

Group A= group C of project 4 18 Hereford dairy cross steers 1953

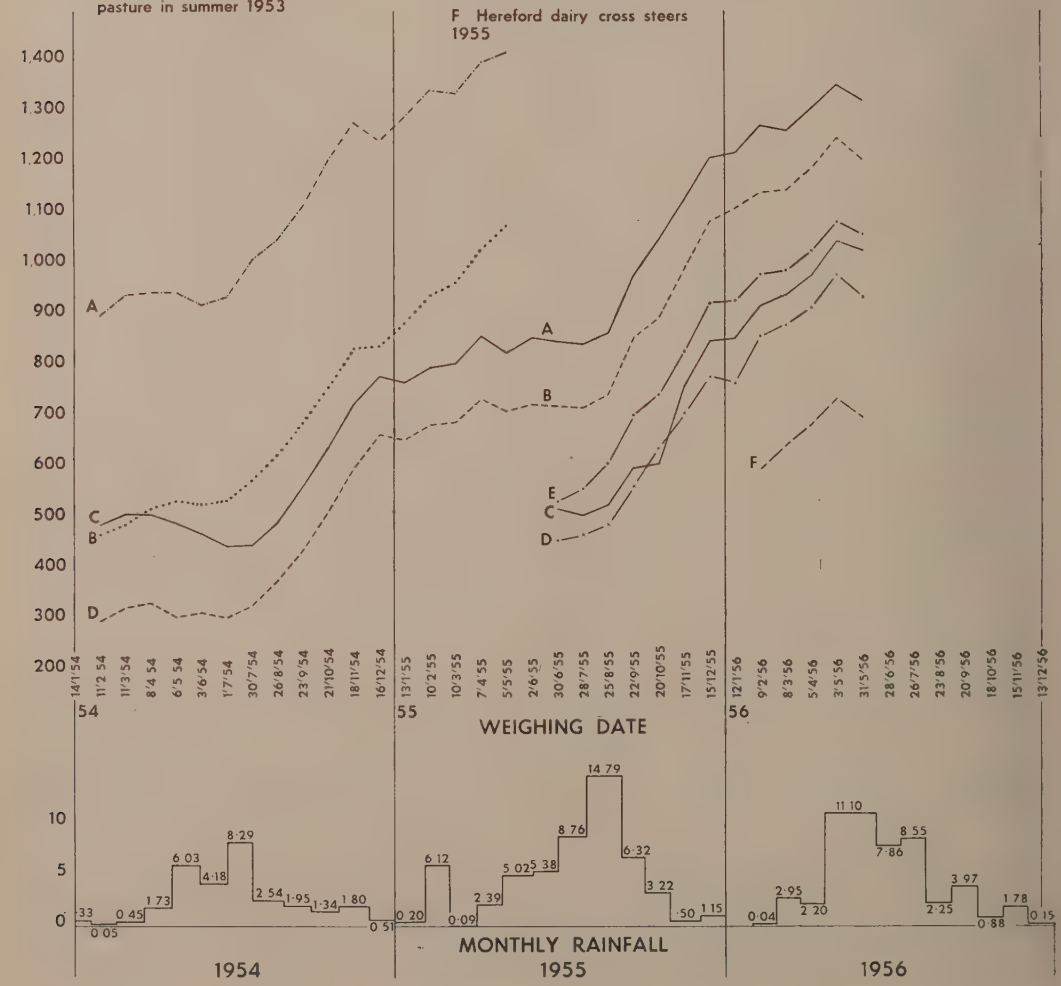
B = group D of project 4 14 A.I.S. steers 1953

C 24 Hereford dairy cross steers 1954

D 5 Aberdeen Angus dairy cross steers 1954

E 16 A.I.S. steers 1954

F Hereford dairy cross steers 1955



"static" period, both groups gained the same amount, i.e. 53 lb.

As pointed out elsewhere, the unirrigated pasture during this summer period was abnormally good.

These two groups were continued as Groups A. and B. of Project 5, and therefore will be the subject of further discussion later.

A study of the growth curves of the groups shows a difference in the summer periods between the cattle grazed on irrigated and those on unirrigated pasture. There was no apparent difference in the trend of weight gain according to age, nor between Hereford cross and A.I.S. cattle under the same grazing conditions. In the two summer periods the yearling Hereford cross steers gained more rapidly than their two-year-old companions.

PROJECT 5

Work in previous years established what can be accepted as a normal growth curve for cattle grazing on unirrigated pastures, and without supplementary feeding.

The results obtained in Project 4 indicated that the use of summer irrigated pasture was effective in changing this normal pattern of growth. The increase in weight obtained in this way, however, was smaller than anticipated.

Project 5 was designed to gain further data on the value of irrigated pasture and to compare the performance of different classes of stock under this treatment.

Period.

June 30, 1955 to May 31, 1956.

Stock.

The animals used were yearling and two-year-old Hereford—dairy, cross and Australian Illawarra Shorthorn steers and yearling Aberdeen Angus—dairy cross steers. Six groups were constituted as follows:—

Group A.—Eighteen Hereford—dairy cross steers born in 1953. These were Group C. of Project 4 which were on unirrigated pasture during the summers of 1953/4 and 1954/5.

Group B.—Twelve Australian Illawarra Shorthorn steers born in 1953, at Claremont and which were Group D. of project 4. These like Group A. above, were grazed on unirrigated pasture in the summers of 1953/4 and 1954/5.

Group C.—Twenty-four Hereford—dairy cross steers bred at Wokalup. 1954.

Group D.—Five Aberdeen Angus—dairy cross steers bred at Wokalup. 1954.

Group E.—Sixteen Australian Illawarra Shorthorn steers bred at Pardelup and Claremont. 1954.

Group F.—Twenty Hereford—dairy cross steers born in 1955 at Wokalup.

Groups C. D. and E. were weaned in February 1955, but were grazed on dry pasture for the remainder of that summer. Weighing did not commence until July 4, 1955.

Seasonal.

As reported for Project 4 pasture growth in early 1955 was excellent and continued even throughout July, despite the particularly heavy rains amounting to 13.26 inches in that month. Further good rains in September and October led to an extension of the expected spring grazing season by about two weeks. Haymaking weather was good and was followed by a period of over eight weeks during which no rain fell. As all the cattle in the project were on irrigated pasture, this dry period did not stop growth, alhough there was a slackening in the rate of weight gain, particularly with the older and heavier beasts of Group A. and B. The rainfall in May was exceptionally heavy and continuous and militated against growth.

Growth Rates and Trends.

Group A.—Eighteen Hereford—dairy cross steers born in 1953. At the commencement of the weighing period, June 30, 1955, they averaged 856 lb. and then grew progressively to 1,358 lb. at May 3, 1956. The weight increase was 502 lb in the 308 days, or 1.62 lb. per day. The rate of growth was slower than average in the months of February and March, when some high atmospheric temperatures were experienced. In the last 28 days to May 31, they lost 35 lb.

Group B.—Twelve Australian Illawarra Shorthorn steers born in 1953. These animals were Group D. of Project 4 and

weighed 726 lb. at June 30, 1955. They increased in weight consistently until May 3, 1956, when they averaged 1,249 lb. which was an increase of 523 lb. in 308 days or 1.70 lb. per day. In the last 28 days to May 31, they lost 45 lb.

Group C.—Twenty-four Hereford—dairy cross steers born in 1954. Their first weighing was on July 4, 1955, when they averaged 518 lb. By May 3, 1956, they had increased to 1,049 lb. i.e. an increase of 531 lb. in 304 days, or an average of 1.70 lb. per day. They, like the other groups, had grown consistently throughout the period except for a lag in the month of January, and a fall in the last 28 days to May 31 of 17 lb.

Group D.—Five animals by an Aberdeen Angus bull born in 1954. Their initial weight on July 4 was 459 lb. and on May, 3, it was 977 lb. thus showing an increase of 518 lb. in the 304 days or 1.70 lb. per day. They lost 8 lb. at the January weighing and 41 lb. on May 31.

Group E.—Sixteen Australian Illawarra Shorthorn 1954 drop steers. They also grew consistently from July 4 to May 3, the respective weights being 523 lb. and 1,086 lb., the gain being the highest for this project, 563 lb. or 1.85 lb. per day over the 304 days. Like Groups C. and D. there was a lag in the December-January period and a fall of 33 lb. in the last 28 days to May 31.

Group F.—Twenty Hereford cross weaners, and their initial weighing was on February 9, 1956, when they weighed 609 lb. They grew steadily to 644 lb. in March, 688 lb. in April and 736 lb. by May 3, but fell to 706 lb. at May 31.

Grazing.

All groups were grazed together, Groups C. D. and E. being constituted in May. Prior to that date, Groups A. and B. had the use of the Bull, Camp and Camdens paddocks. With the addition of the new groups, Camdens was used till June 30, when after one week on the irrigation paddocks all were removed to the hill paddocks. Two weeks were spent in Camp in the first half of August, followed by changes in Fry's Hill, Experimental and Camdens Hill until they were brought on to irrigated pasture after the December 12 weighing.

Thus all cattle were grazed together throughout the period, on winter-type subterranean clover dominant pasture in the winter and spring, of 1955, and on irrigated pasture of perennial ryegrass and white clover and of *Paspalum dilatatum* and white clover during the summer of 1955/56.

Groups A. and B. (Groups C. and D. of Project 4), had been kept on unirrigated pasture during the two previous summers.

The animals of the other groups were with their dams until February of 1955, but were not on irrigated pasture until the summer of 1955/56.

Discussion.

(In this discussion ages are those at the commencement of the period.)

This project provides a comparison of the growth rate of Hereford—dairy cross steers with pure bred A.I.S. steers at two ages, with yearling Aberdeen Angus—dairy cross steers and with Hereford—dairy cross weaners.

All animals increased in weight during the period June 30, 1955, to May 31, 1956, although there were some irregularities in the trend of gain with individual animals and with the groups.

The total respective gains were:—

Group A.—467 lb. in 336 days.
Group B.—478 lb. in 336 days.
Group C.—514 lb. in 332 days.
Group D.—477 lb. in 332 days.
Group E.—530 lb. in 332 days.
Group F.—95 lb. in 112 days. (February 9 to May 31.)

All groups lost weight in the final 28 days. In the following comments, trends are discussed for two periods approximating to the "growing" and the "static or losing" periods of previous projects, even though in this project the latter period was one of rising weight. The discussion is therefore based on the period ending May 3, which coincides with the date of maximum weight for each group.

Unexplained irregularities occur in the amount of gain monthly. These are almost certainly due to variations in the content of the paunch and intestine at the moment of weighing. These variations have been caused at times by unavoid-

able delays in weighing. Such irregularities have a tendency to "iron out" in subsequent weighings. Several such cases may be observed in this project by reference to the monthly weight tables.

Apart from the establishment of growth curves for irrigated pasture in comparison with those of Project 4, these two groups A. and B. were intended to provide information regarding relative growth rates of the same animals in successive summer periods, two on unirrigated and the last on irrigated pasture. The value of this comparison, however, was reduced because growth rates in the months following the abnormal February rains of 1955 had not followed what was accepted as the normal trend.

There was little difference in the weight gain over the whole period, but a slight margin existed in favour of the A.I.S. beasts, i.e. 523 lb. compared to 502 lb. for the Hereford crosses.

An examination of the respective rates of growth in the winter and early summer, i.e. June 30, 1955, to January 12, 1956, and in the summer and autumn, i.e. January 12 to the May 3, 1956, shows that the A.I.S. grow at a very slightly faster rate in the former period: 384 lb. compared with 365 lb., but during the summer and autumn, i.e. the period on irrigated pasture, the rate of growth was almost the same—139 lb. and 137 lb. respectively.

Greater weight gains were recorded also for the yearling A.I.S. (Group E.) when compared with Hereford crosses of the same age (Group C.). The relative rates for the whole period of 304 days were 563 lb. or 1.85 lb. per day, and 531 lb. or 1.75 lb. per day.

A still greater advantage in favour of the A.I.S. group was shown in the winter-spring sub-period. This Group E. gained 406 lb. or 2.07 lb. per day compared with 337 lb. or 1.72 lb per day. In the following sub-period, summer and autumn, Group C. had a better performance—194 lb. or 1.73 lb. per day, while Group E. put on 157 lb. or 1.40 lb. per day.

Other comparisons are possible between yearling and two-year-old Hereford cross steers, and also between the same age groups with A.I.S. steers.

The yearling Hereford cross gained 531 lb. in the 304 days, compared with 502 lb. for the two-year olds in 308 days. The respective daily weight gains were 1.75 lb. and 1.62 lb. The older cattle grew more rapidly in the winter and early summer, 1.85 lb. per day (365 lb. in 196 days), compared to 1.72 lb. (337 lb. in 196 days) for the yearlings, but the latter gained weight at the rate of 1.73 lb. per day (194 lb. in 112 days) compared with 1.22 lb. per day for the older animals (137 lb.) during the summer and autumn.

The same pattern was not repeated with the A.I.S., the younger cattle gaining more rapidly in both sub-periods and therefore also over the whole period. In the winter and early summer the respective gains and rates per day were, for the yearlings, 406 lb. or 2.07 lb. per day, and for the two-year-olds 384 lb. or 1.95 lb. per day. In the summer and autumn period the respective rates were—yearlings 157 lb. or 1.40 lb. per day, and for the two-year-olds 139 lb. or 1.24 lb. per day. For the whole period the younger cattle gained 563 lb. in 304 days, i.e. 1.85 lb. per day, while the older group gained 523 lb. in 308 days, or 1.70 lb. per day.

From the foregoing the following tentative conclusions relating to the whole period may be drawn:—

(1) The yearling Hereford cross and the A.I.S. steers grew slightly more rapidly than the two-year-old animals.

(2) The A.I.S. steers, both yearling and two-year-old, grew more rapidly than did the Hereford cross steers of the same ages.

The performance of the five yearling animals by an Aberdeen Angus bull (Group D.) was very slightly better than the Hereford cross two-year-olds of Group A., and slightly lower than the younger Hereford cross yearlings of Group C. They were the same as the two year old A.I.S. Group B., and inferior to the A.I.S. yearlings.

During the winter/spring sub-period, their weight gain was inferior to the other groups, but only slightly lower than the Hereford yearlings. In the summer/autumn their gain was superior to all

except the Hereford cross yearlings of Group C.

Group F. of weaner Hereford cross steers was brought into the trial after weaning in February 1956.

They had been grazed with their dams on irrigated pasture where they stayed when the latter were removed to another part of the property. Their rate of gain was more rapid during the 84 days from February 2 to May 3, 1956, than the other groups, except the Hereford cross yearlings which grew at approximately the same rate, the weaners gaining 127 lb. and the yearlings 129 lb., equal to slightly more than 1.5 lb. per day.

The influence of keeping the suckling dams and calves and then the weaned calves on irrigated pasture is shown by the average weights (736 lb.) at May 3, 1956, when they were then one year of age. For comparison, the weights of the other groups at June 30 and July 4 of the previous year when Groups A. and B. were over two years old and Groups C. D. and E. over one year, were—

Group A.—856 lb.
Group B.—726 lb.
Group C.—518 lb.
Group D.—459 lb.
Group E.—523 lb.

The project established the value of irrigated pasture as there were gains in all groups of substantial amounts during the summer months, while in previous years losses of weight on dry pasture were recorded with the exception of the summer of 1955, when abnormal February rains stimulated the growth of couch grass and early germination of winter pasture. The gains of the groups during the 140 days from December 15, 1955, to May 3, 1956, were—

Group A.—144 lb. or 1.03 lb per day.
Group B.— 168 lb. or 1.20 lb. per day.
Group C.—199 lb. or 1.42 lb. per day.
Group D.—185 lb. or 1.30 lb. per day.
Group E.—160 lb. or 1.14 lb. per day.

In the previous year, Group A. gained 47 lb. in 140 days from December 16, 1954, to May 6, 1955, while Group B. gained 44 lb. The greater weight put on by these two groups during the summer of 1956, therefore, was 97 lb. and 124 lb. respectively.

Sale.

All the animals with the exception of six were sold in June, 1956. The following table sets out the result:—

Group.	No. of Animals.	Breed.	Age.	Live Weight at 31–5–56.	Price at Auction, 5–6–56.	
					Per Head.	Average per lb. d/w.*
			Years.	Lb.	£ s. d.	pence.
A	17	HX	3	1,323	11 @ 65 12 6	20·9
					6 @ 60 12 6	
B	12	AIS	3	1,204	10 @ 60 7 6	19·5
					2 @ 58 2 6	
C	24	HX	2	1,032	12 @ 58 7 6	23·7
					11 @ 57 7 6	
					1 @ 45 2 6	
D	5	AA	2	936	3 @ 55 2 6	23·3
					2 @ 45 2 6	
E	16	AIS	2	1,032	6 @ 58 2 6	21·8
					8 @ 55 7 6	
					2 @ 46 7 6	

* Dead weight at 56% of live weight.

In the following, ages are as at time of sale as shown in the above table.

It will be noted that—

(i) There was a price per lb. margin in favour of the two-year-olds, Hereford crosses of 0.4 pence per pound over the Aberdeen Angus crosses, which in turn brought 1.5 pence per pound more than the A.I.S. of the same age.

(ii) The yearlings all brought higher rates than the two-year-olds, there being a margin of 2.8 pence

per pound in favour of the younger Hereford crosses over their two-year-old companions and of 2.3 pence per pound between the groups of A.I.S.

(iii) The margin in favour of the three-year-old Hereford crosses compared to the three-year-old A.I.S. was 1.4 pence per pound, while that between the two-year-old groups was 1.9 pence per pound.

The added value of the three-year-olds (at time of sale) Groups A. and B. were not in proportion to age. The premium in price for younger and lighter animals would appear to determine the optimum time at which such animals should be marketed.

The reduction in the price per pound of the two-year-olds resulted in the average return per beast being only £8 13s. 6d. per head above the two-year-olds in the case of the Hereford crosses, and £4 14s. 3d. for the A.I.S.

In other words, the average return per year of age for the two-year-old Hereford crosses was £28 3s. 6d. and that for an additional year of growth for the three years was £7 10s. 1d. only. With the A.I.S. the corresponding figures are £26 15s. 9d. and £6 8s. 6d. only.

The requirements of the market for young beasts is particularly strongly stressed by these price differentials.

The six which were retained from sale in June were entered as two pens in the Royal Show Beef Carcass Competition conducted in conjunction with the Australian Meat Board. One pen was of Hereford crosses and the other of Aberdeen Angus crosses. The latter were unfinished and hardly a fair sample, as selection was made from a total of five animals only. The Hereford crosses were placed ninth in a total entry of 19, when judged on the hoof. As carcasses, however, they gained equal fourth place, scoring as follows:—

Early maturity	14 out of 14 maximum.
Conformation ..	17 out of 24 maximum.
Finish	11 out of 12 maximum.
Quality	7 out of 10 maximum.
Total	49 out of 60

PROJECT 4 (Group A.)

23 H.X. Steers 1952.

On Irrigated Pasture in Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
11-2-54	903		
11-3-54	941	+38	+1·35
8-4-54	946	+ 5	+0·18
6-5-54	948	+ 2	+0·07
3-6-54	922	—26	—0·93
1-7-54	938	+16	+0·57
29-7-54	1,009	+71	+2·54
26-8-54	1,048	+39	+1·39
23-9-54	1,119	+71	+2·54
21-10-54	1,204	+85	+3·04
18-11-54	1,278	+74	+2·65
16-12-54	1,246	—32	—1·14
13-1-55	1,290	+44	+1·57
10-2-55	1,345	+55	+1·96
10-3-55	1,338	— 7	—0·25
7-4-55	1,397	+59	+2·11
5-5-55	1,415	+18	+0·65

PROJECT 4 (Group B.)

18 H.X. Steers 1953.

On Irrigated Pasture in Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
11-2-54	467	....	....
11-3-54	491	+24	+0·86
8-4-54	519	+28	+1·0
6-5-54	531	+12	+0·43
3-6-54	529	— 2	—0·07
1-7-54	532	+ 3	+0·11
29-7-54	576	+44	+1·57
26-8-54	625	+49	+1·75
23-9-54	689	+64	+2·29
21-10-54	760	+71	+2·54
18-11-54	835	+75	+2·68
16-12-54	838	+ 3	+0·11
13-1-55	887	+49	+1·75
10-2-55	940	+53	+1·90
10-3-55	966	+26	+0·93
7-4-55	1,030	+64	+2·29
5-5-55	1,073	+43	+1·54

PROJECT 4 (Group C.)

18 H.X. Steers 1953.

On Unirrigated Pasture in Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
11–2–54	488	....	....
11–3–54	509	+21	+0·75
8–4–54	513	+ 4	+0·14
6–5–54	484	—29	—1·04
3–6–54	477	— 7	—0·25
1–7–54	450	—27	—0·96
29–7–54	452	+ 2	+0·07
26–8–54	495	+43	+1·54
23–9–54	569	+74	+2·65
21–10–54	641	+72	+2·58
18–11–54	726	+85	+3·04
16–12–54	781	+55	+1·96
13–1–55	775	— 6	—0·21
10–2–55	798	+23	+0·83
10–3–55	804	+ 6	+0·21
7–4–55	859	+55	+1·96
5–5–55	828	—31	—1·11

PROJECT 5 (Group A.)

18 Hereford Cross Steers 1953.

On Irrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
30–6–55	856	....	....
28–7–55	841	—15	—0·54
25–8–55	865	+25	+0·89
27–9–55	971	+106	+3·79
20–10–55	983	+12	+0·43
17–11–55	1,134	+151	+5·39
15–12–55	1,214	+80	+2·86
12–1–56	1,221	+ 7	+0·25
9–2–56	1,271	+50	+1·79
8–3–56	1,266	— 5	—0·15
5–4–56	1,305*	+39	+1·39
3–5–56	1,358	+53	+1·89
31–5–56	1,323	—35	—1·25

* One Hereford Cross died.

PROJECT 4 (Group D.)

14 A.I.S. Steers 1953, ex Claremont.

On Unirrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
11–2–54	302	....	....
11–3–54	331	+29	+1·04
8–4–54	339	+ 8	+0·29
6–5–54	311	—28	—1·04
3–6–54	317	+ 6	+0·21
1–7–54	309	— 8	—0·29
29–7–54	330	+21	+0·75
26–8–54	384	+54	+1·93
23–9–54	440	+56	+2·00
21–10–54	514	+74	+2·65
18–11–54	599	+75	+2·68
16–12–54	667	+68	+2·43
13–1–55	659	— 8	—0·29
10–2–55	688	+29	+1·04
10–3–55	690	+ 2	+0·07
7–4–55	738	+48	+1·71
5–5–55	712	—26	—0·93

PROJECT 5 (Group B.)

12 A.I.S. Steers 1953, ex Claremont.

On Irrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
30–6–55	726	....	....
28–7–55	721	— 5	—0·18
25–8–55	748	+27	+0·96
27–9–55	854	+106	+3·79
20–10–55	895	+41	+1·46
17–11–55	996	+101	+3·61
15–12–55	1,081	+85	+3·04
12–1–56	1,110	+29	+1·04
9–2–56	1,139	+29	+1·04
8–3–56	1,144	+ 5	+0·18
5–4–56	1,184	+40	+1·43
3–5–56	1,249	+65	+2·32
31–5–56	1,204	—45	—1·61

PROJECT 5 (GROUP C.)

24 Hereford Cross Steers 1954.
On Irrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
30–6–55	518	....	....
28–7–55	509	— 9	—0·32
25–8–55	529	+20	+0·71
27–9–55	603	+74	+2·64
20–10–55	610	+ 7	+0·25
17–11–55	761	+51	+1·82
15–12–55	850	+89	+3·18
12–1–56	855	+ 5	+0·18
9–2–56	920	+65	+2·32
8–3–56	941	+21	+0·75
5–4–56	986	+45	+1·61
3–5–56	1,049	+63	+2·25
31–5–56	1,032	—17	—0·61

PROJECT 5 (Group D.)

5 Aberdeen Angus Steers 1954.
On Irrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
30–6–55	459	....	....
28–7–55	474	+15	+0·54
25–8–55	494	+20	+0·71
27–9–55	567	+75	+2·68
20–10–55	638	+71	+2·54
17–11–55	709	+71	+2·54
15–12–55	792	+83	+2·96
12–1–56	784	— 8	+0·29
9–2–56	863	+79	+2·82
8–3–56	880	+17	+0·61
5–4–56	916	+36	+1·29
3–5–56	977	+61	+2·18
31–5–56	936	—41	—1·46

PROJECT 5 (Group E.)

16 A.I.S. Steers ex Claremont and Pardelup.
On Irrigated Pasture Summer Months.

Date.	Weight Average.	Change of Weight Since Previous Weighing.	
		Total Change.	Average per Day.
	lb.	± lb.	± lb.
30–6–55	....	....	....
4–7–55	523	....	....
28–7–55	561	+38	+1·36
25–8–55	610	+49	+1·75
27–9–55	702	+92	+3·29
20–10–55	746	+44	+1·57
17–11–55	833	+87	+3·11
15–12–55	926	+93	+3·32
12–1–56	929	+ 3	+0·11
9–2–56	977	+48	+1·71
8–3–56	985	+ 8	+0·29
5–4–56	1,027	+42	+1·5
3–5–56	1,086	+59	+2·1
31–5–56	1,053	—33	—1·18

PLAN

Your egg supply with easy to rear
DAY OLD CHICKS
or
STARTED PULLETS
Ring ML 543.

Breeders:
AUSTRALORP W/LEGHORN,
FIRST CROSS
Cnr. Epsom and Smith Aves., Redcliffe
GOVERNMENT LICENSED
AIR-CONDITIONED HATCHERY

Skim Milk Alone is Not Enough!

Don't be satisfied with "paunchy," stinted calves, because later on the milk yield from them will also be stinted. The growth period is a time of preparation for lifetime performance, so feed GRO-CALF for true growth, which will in turn guarantee production to the limit of the capacity bred into your calves. Reasonable expenditure to ensure CORRECT NUTRITION now will inevitably pay dividends at every milking during the animal's productive life. Calves need the nutritional perfection of GRO-CALF to ensure OPTIMUM DEVELOPMENT and this new, up-to-the-minute calf food may be fed with skim milk or it will raise calves successfully without any milk at all after the first few weeks

"Look for the checker-board bags"

GRO-CALF
IS THE BEST CALF MEAL

Obtainable from Barrow Linton's or your Local Produce Merchant

Manufactured in Western Australia by . . .

BARROW LINTON PTY. LTD.

Under licence from CLARK KING & CO. PTY. LTD.

By MARGARET SPENCER

SOME POPULAR PUDDINGS

HOT steamed or boiled puddings are welcome fare on the dinner table, especially on cool evenings, and they give lots of scope for variation. Puddings containing suet may be boiled or steamed, though steaming gives the lighter result, but cake mixtures should be steamed as they tend to break up if boiled.

SUET PUDDINGS

General Points.

The pudding cloth used should be made from scrupulously clean calico, dipped in boiling water, wrung tightly, then floured. This may be used to cover the basin or the suet mixture may be turned into it and, leaving room for rising, tied firmly. When the pudding is to be steamed it should be cooked in a greased basin, covered with greased paper. If steaming, remember this is slower than boiling and allow half as long again as for boiling. Whether boiling or steaming, remember that the water must be boiling when the pudding is put on to cook and must be kept boiling throughout the cooking time if the pudding is to be successful. The saucepan lid should be tight fitting. If the water is boiling away, more **boiling** water must be added. When the saucepan is removed from the heat the pudding should be lifted immediately and not allowed to cool down in the water.

The foundation of these puddings is ½ lb. suet to 1 lb. flour with 2 to 4 level teaspoons baking powder added, depending on the other ingredients used. The use of soft white breadcrumbs to replace some of the flour, or the addition of well-beaten eggs will make less raising agent necessary. Sometimes half S.R. flour and half plain will be used or even all S.R. flour while bicarbonate of soda (baking soda) may be used with fruit juice, treacle, or golden syrup to replace baking powder.

The suet chosen should be firm and all papery membrane removed before weighing. Beef suet is preferred to mutton suet in cooking and when chopping or grating it, use some of the measured flour to prevent sticking.

Generally the mixtures are rather stiff, but not crumbly, though more moisture may be used in puddings to be steamed than those to be boiled.

Cooking time will vary from 2 to 5 hours according to richness of the pudding and the quantity of fruit used. When a large proportion of breadcrumbs is used the pudding is better steamed.

In deciding the size of pudding you need, allow 1½ to 2 oz. flour per person.

When the recipe calls for lining a basin with suet crust (as in boiled apple pudding

and steak and kidney pudding) the following method is quick and easy. Roll the pastry to a neat round, 2in. bigger than the basin to be used. Then cut out a triangular piece which is rolled out later to make the lid.

Wet edge 1 and place edge 2 on top of it, pressing together. Lift carefully into the greased basin, pressing to make it fit smoothly. Next dampen the three points of the remaining piece and fold them in to make a round, then roll to fit the top of the basin. After the filling has been placed in the basin, moisten the edges of the lid and fix firmly on top. The pudding is then covered with a pudding cloth, prepared as explained earlier, or with greased paper.

BASIC SUET PUDDING (WITHOUT EGGS)

Ingredients.

½ lb. plain flour (or flour and breadcrumbs).
¼ teaspoon salt.
4 oz. suet.
1 level teaspoon baking powder.
2 oz. sugar, golden syrup, honey or treacle.
Water or milk.

Method—

1. Sift flour, salt, and baking powder.
2. Add finely chopped suet.
3. Add sugar (syrup, etc.).
4. Add sufficient liquid to make a stiff mixture.
5. Cook in prepared pudding cloth or greased basin, boiling 2 hours, steaming 3 hours.

This recipe can be varied in many ways as the following examples show:—

FRUIT AND TREACLE PUDDING

Ingredients.

½ lb. plain flour (or flour and breadcrumbs).
4 oz. suet.
1 level teaspoon bicarbonate of soda.
¼ teaspoon salt.
2 oz. treacle.
½ cup sultanas.
1 level teaspoon ground ginger.
Milk.

Method—

As for basic suet pudding. Adding fruit at the same time as treacle.

FRESH FRUIT PUDDING

Ingredients.

8 oz. plain flour.
4 oz. suet.
¼ teaspoon salt.
1 level teaspoon baking powder.
¼ cup chopped apples.
2 oz. honey.
½ level teaspoon cinnamon or mixed spice.
Milk or water.

Method—

As for basic suet pudding.

SPICY FRUIT PUDDING

Ingredients.

8 oz. S.R. flour (or S.R. flour and breadcrumbs).
¼ teaspoon salt.
4 oz. suet.
3 oz. sugar.
6 oz. dates or mixed fruit.
1 teaspoon mixed spice.
Milk.

Method—

As for basic suet pudding. Boil 2½-3 hours.

SUET PUDDING (WITH EGGS)

Ingredients.

4 oz. flour.
4 oz. breadcrumbs.
4 oz. suet.
pinch of salt.
2 eggs.
2 to 4 oz. sugar (honey, etc.).
½ cup milk.

Method—

As for basic recipe, beating eggs well before adding them.

Any of these (or others of your own choice) may be added—

1. 4 oz. chopped dates (steam 2½ hours).

2. 4 oz. raisins, 4 oz. currants, 1 teaspoon spice. Use golden syrup. (steam 3½ hours.)

3. Golden syrup or treacle may be used instead of sugar.

4. ½ lb. chopped apples, ½ oz. chopped lemon peel, 1 level teaspoon cinnamon (steam 2½ hours).

BOILED APPLE PUDDING

Ingredients.

Pastry—

3 oz. S.R. flour.

3 oz. breadcrumbs or plain flour.

3 oz. suet.

pinch salt.

Water to mix.

Filling—

1 lb. apples.

2 oz. sugar (or honey).

3 cloves.

2 tablespoons water.

Method—

Sift flour and salt.

Add breadcrumbs.

Add finely chopped suet.

Add sufficient water to make an elastic dough.

Roll pastry as directed in general points and line a greased basin.

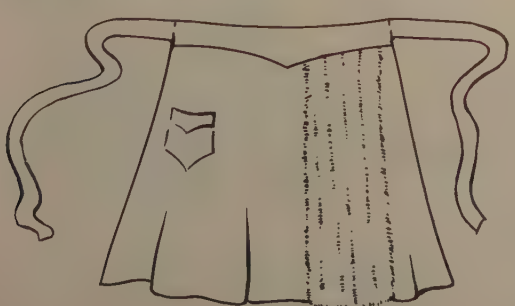
Fill and cover with pastry.

Cover with greased paper.

Steam 2½-3 hours.

A USEFUL KITCHEN APRON

So often caught in the act of washing-up or peeling vegetables and having to reach hurriedly for a towel someone's just moved, I thought the following a wonderful and so very simple minute saver.

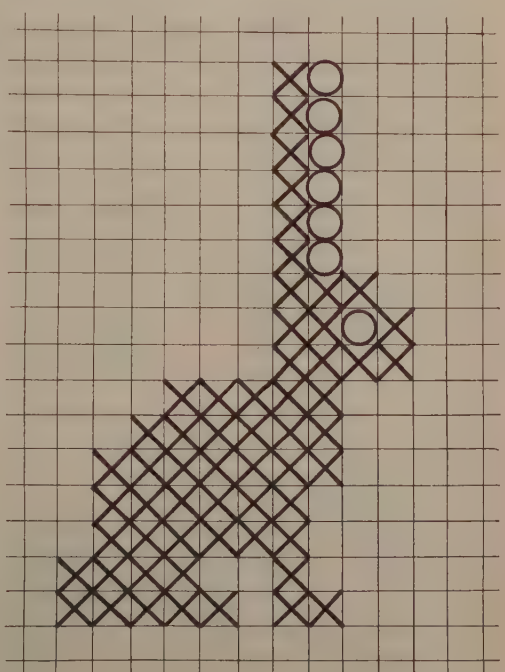


Stitched into the band at one side of an ordinary waist-apron, a strip of roller towelling, just the length of a short apron, is not only practical but colourful too. As small gifts for the "about-to-be-marrieds" you will find these aprons very popular.

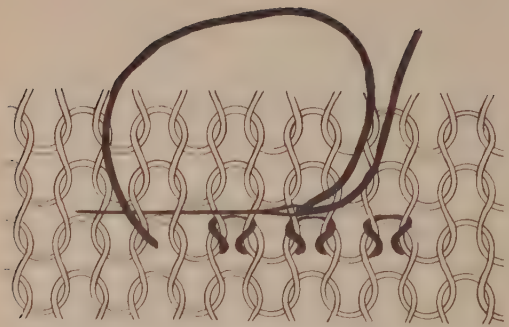
COLOURFUL TOUCHES ON KNITTEDS

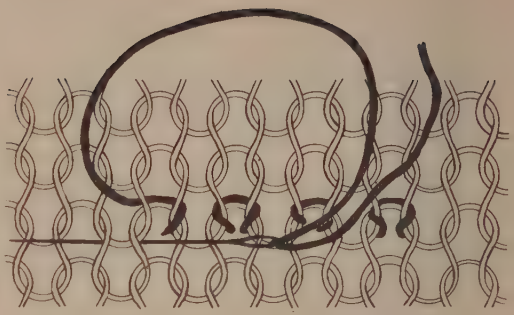
Everyone seems to have caught the knitting bug this winter, and brightly coloured jumpers and cardigans are very popular. To add individuality, colour and dash to a plain pullover try embroidering designs in "knitting stitch." This is simple to do, and looks as if the pattern has been knitted as in fair-isle work.

Use squared or graph paper to plan your motif, each square representing one stitch. Use coloured pencils or dots and crosses to show your colour scheme. (* See illustration.)



The stitch used to embroider your design is worked directly over each knitted stitch. Insert the needle from the back of the





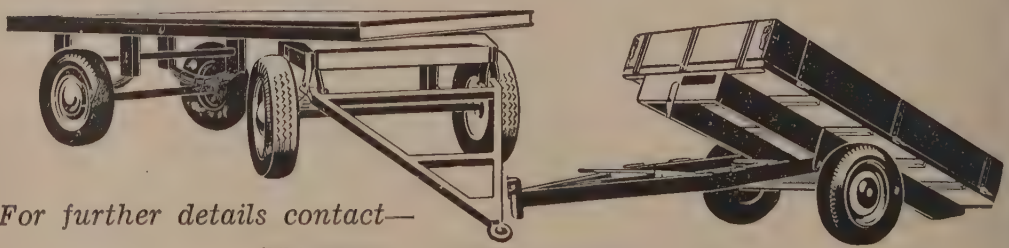
work in the centre of the stitch and draw through. *Insert needle from right to left under the two loops of the same stitch one row above and draw through, then insert needle back into original place where needle was first inserted, draw underneath the two loops still working from right to left, and out into the centre of the next stitch, completing one stitch. Repeat from *to end of graph pattern.

Four ply wool used on 3 ply or on 4 ply knitting, crochet wool on crochet knitting are successful but 3 ply is not effective on 4 ply.

NOW! FARM TRAILERS

1/3 DEPOSIT

2 years to pay



For further details contact—

MARTIN NIXON PTY. LTD.

275 James Street, Perth

PREPARING CATTLE FOR SHOWS

Foot Care and Grooming are Important

By T. PARKER

IN the days before motor-cars and tractors were in general use, there was an old saying "A horse is only as good as his feet," or more briefly "No foot—no horse." Feet are just as important to cattle, and foot care is a necessary part of show-ring preparation. Without good feet, cattle cannot walk freely and a bad gait has put many a good animal out of the prize-winning groups.

If the toes pinch or rub together; if they are too long, or the walls of the hooves are too high the gait is sure to be affected. The animal is thrown off balance and forced to take short steps. Painful feet cause it to change step and prevent the free stride that the judge likes to see.

Even in the paddocks, neglected feet exact their toll as the animals cannot move around and feed freely, so that they lose condition. The care of the bull's feet is particularly important as he must be able to move freely and he cannot work properly if attempting to balance on painful hooves and legs.

Feet should be trimmed carefully to suit an individual animal's gait, and a good hoof dressing should be used frequently. Neatsfoot oil is quite effective for this purpose.

SOME GROOMING HINTS

Most cattlemen use the rubber currycomb and a soft brush for grooming. May I suggest two alternatives which I have found even better.

Instead of the currycomb I use a pair of cricketer's batting gloves in reverse—putting the left-hand glove on the right hand and the right-hand glove on the left so that the rubber guards are on the palms of the hands.

Used in this manner, the gloves are ideal for lifting and placing the long hair on beef cattle or for applying just the right degree of pressure on the shorter-haired dairy breeds. The gloves are excellent for combing and polishing the tail hairs, and I find that by gentle rubbing I can tone up the skin and remove all dust and dirt. The cattle respond well to the treatment and enjoy the gentle friction on their skins.

I am having a special pair of these gloves made with elastic round the wrists and the rubber placed inside the hand on the fingers only. I think that these will be even more effective than the orthodox batting gloves.

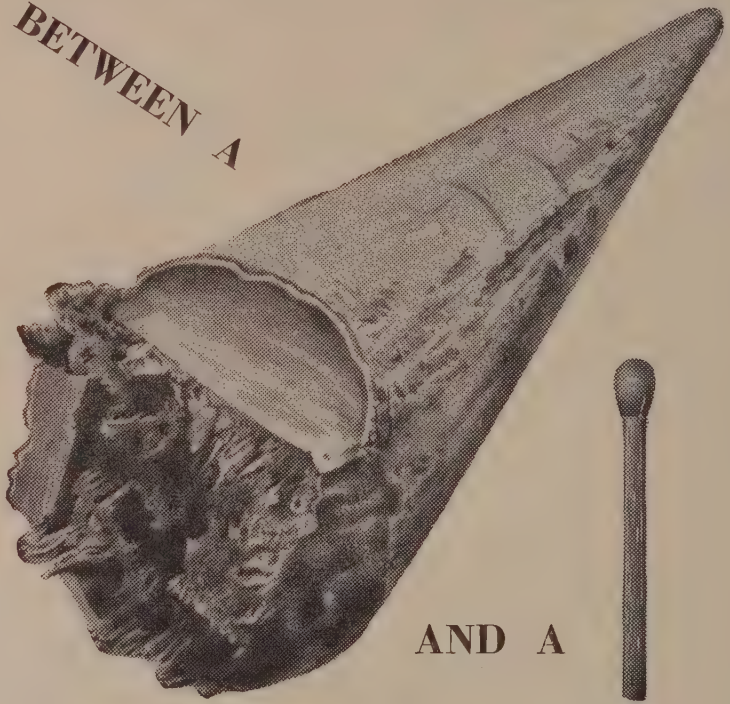
The soft brush for finishing off the grooming can also be improved upon. For many years I have used pieces of sheepskin from pelts carrying about ½in. of wool.

The pelt is cut into rectangles measuring about 10in. x 5in. and slits are made across the 5in. width to take the first and third fingers.

After using the batting gloves to remove dust and scurf I rub the animal with the skin side of the pelt. The friction between the skin and the animal's hide generates sufficient heat to encourage the natural oils to flow. I then continue the grooming with the wool next to the hide.

The wool grease (lanoline) gives a pleasing gloss to the animal's coat. When the natural oil in the skin side of the pelt has been used up, I paint it lightly with olive oil which is readily absorbed. The sheepskin lasts for years and does not wear out like the brushes, and I can recommend this method of grooming which I have tested thoroughly over a number of years.

BETWEEN A



AND A

COMES A SHEEPYARD

How about **your** sheepyards?
Did you design them?
How wise you were if you used wood!
Wood is so economical and so adaptable.
Any sheepyard design is so easy to erect . . . and adds to the efficient running and Capital value of your farm when made with **TIMBER!**

Karri and Jarrah supplied at—

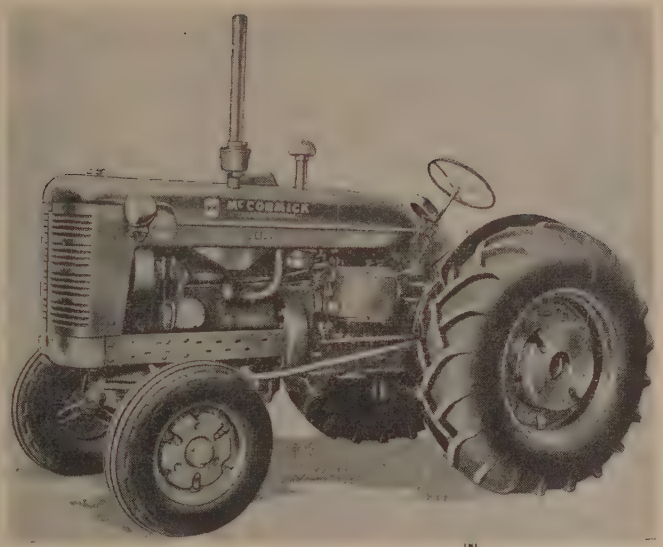
Holyoake
Worsley
Deanmill
Pemberton
Shannon River
Buckingham

Rough timber supplied direct from the mills. Sawn and dressed from vendors Perth yard or Merredin or Narrogin banks.

SBS
STATE BUILDING SUPPLIES

Previously State Saw Mills and Brickworks

AUSTRALIAN TRACTOR TESTS



REPORT ON TEST No. 27
(Farmers' Edition)

McCORMICK INTERNATIONAL—SUPER AW-6 (KEROSENE)

(Tested for the International Harvester Co. of Australia, Geelong)

THIS Report is taken from the full Technical Report No. 27 of this test; test results are shown here in briefer form; fuller explanations are added. Values quoted here may be rounded out to two instead of three significant figures; to this extent the values quoted may differ slightly, but not significantly from those shown in the Technical Report. Graphs of belt test performance, shown in the Technical Report, are not shown here. The Technical Report is not available in large numbers, but may be seen at the offices of the State Departments of Agriculture, the Bureau of Sugar Experiment Stations (Queensland), and the Commonwealth Department of Primary Industry.

1. THE TESTS

(1) After 12 hours of running-in, two types of tests were carried out, in order to measure *the performance of the engine,* as measured by the power in the belt driven by the belt pulley, and *the performmance of the tractor as a whole,* as measured by drawbar pull, tractor speed, wheel slip, and drawbar horsepower (d.b.h.p.), with the tractor running on a bitumen test track.

The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne; under this agreement, the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is: c/o Department of Primary Industry, 301 Flinders Lane, Melbourne.

The main results of these tests are given in Sections 2, 3, and 4. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

(2) Fuel Mixture Settings.—The engine of this tractor has two fuel-mixture settings, "rich" and "operating." Rich mixture was used in tests of observed maximum power (belt and d.b.); operating mixture was used for all other tests.

(3) Governor Control.—The engine was under the control of the governor set to give maximum power and full throttle at rated engine speed.

(4) Fuel.—Power kerosene, octane No. 52. Specific gravity 0.83; weight per imperial gallon 8.34 lb.

(5) Specification.—Engine No. AC264 2418. For a brief specification of this tractor see Section 6 at the end of this report.

2. SUMMARY OF POWER OUTPUT

Table A

——	At the Belt.	At the Drawbar.
Rated engine speed, r.p.m.	1,450	1,450
Corrected maximum power(*a*)	41·3	38·8
Rated power (*b*)	35·1 (*b*1)	29·1 (*b*2)

Note.—Letters in brackets refer to explanatory footnotes.

(*a*) Corrected maximum h.p. is calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29·92″ (sea level) barometric pressure. No correction is applied to diesel engines because there is no suitable formula; the values shown above are therefore the observed maximum powers.

(*b*) Engines are not expected to run indefinitely at full or maximum power output. But they can be expected to run continuously for some hours at *rated* output, which is less than maximum, defined as follows:—

(*b*1) Rated b.h.p. is defined as 85 per cent. of corrected maximum b.h.p.;

(*b*2) Rated b.d.h.p. is defined as 75 per cent. of corrected maximum d.b.h.p.

3. BELT TESTS

The belt tests show the power (belt horsepower, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

Table B—Belt Test Results

Rich mixture for items 3, 4, 5, 8 (i) and 9. Operating mixture for 6, 7, 8 (ii).

	B.H.P.	Engine Speed.	Fuel. Gall./hr. (*c*).	Fuel. lb./b.h.p. hr. (*d*)
1. Rated engine speed, 1,450 r.p.m. 2. Fast idling speed about 1,580 r.p.m.				
3. Observed maximum b.h.p. at rated speed (rich mixture)	42·3	1,446	2·98	0·59
4. Corrected maximum b.h.p. rated speed (*a*)	41·3	....	....	....
5. Calculated rated load (*b*1)	35·1	....	....	....
6. Test at approximately rated load	35·1	1,512	2·59	0·62
7. Average loading under governor (*e*)	22	1,530	2·0	0·76
8. Equivalent engine torque at full throttle	(i) 153 ft. lb. at maximun power and rated speed (ii) 176 ft. lb. (maximum at 980 r.p.m.			
9. Repeat of (3) above after 48 hours	No significant change.			

(*c*) Fuel consumption in gallons/hour may be a simple unit, but it has no meaning unless we also quote the corresponding h.p. output.

(*d*) This is the "specific fuel consumption," the weight of fuel consumed per unit of energy developed by the engine; the unit of energy here is the h.p.-hour, similar to the electrical "unit," the kilowatt-hour. When this figure is least the engine is giving its best economy or efficiency. It is easy to change from column (*c*) to column (*d*) in Table B, *e.g.*, as follows:—
2·98 galls./hr. while developing 42·3 h.p. means 2·98 ÷ 42·3 galls./b.h.p./hr. = 0·070 gall./b.h.p./hr.
0·070 gall./b.h.p./hr. x 8·34 lb./gallon for this fuel = 0·59 lb./b.h.p./hr., as shown in column (*d*).

(*e*) Line 7, Table B, represents the average performance one might expect from the engine while driving a variety of belt loads, from light to heavy. In terms of average fuel consumption, it means about 2 gallons an hour.

4. DRAWBAR TESTS

(1) The following Tables C, D, and E, show the drawbar performance of the tractor, on the bitumen test track, wearing rear tyres 14 x 30, carrying maximum weight (2,300 lb. front, 6,120 lb. rear; total 8,420 lb.), working in the gears named in the tables. Height of drawbar 16 inches.

Drawbar tests, using standard and minimum weights of tractor, were carried out, but are not reported here.

Table C—Maximum Power, Rated (3rd) Gear

Rich mixture.

	DBHP (*f*).	Pull. lb.	Speed. m.p.h.	Wheel Slip. % (*g*).
1. Rated engine speed, 1,450 r.p.m.				
2. Observed maximum b.d.h.p. at rated engine speed	39·4	3,340	4·42	5½
3. Corrected maximum d.b.h.p. at rated engine speed (*a*)	38·8			
4. Calculated rated load(*b*2)	29·1			

Table D—Pull at Maximum d.b.h.p.

All gears, rated engine speed, operating mixture, see note (*h*).

Gear.	D.B.H.P.	Pull. lb.	Speed. m.p.h.	Wheel Slip. %
1	24	6,020	1·5	14
2	37	4,150	3·3	7
3	38	3,220	4·4	5
4	38	2,620	5·4	4
5	Road speed not tested			

(*f*) D.B.H.P. is the product of pull (lb.) and speed (m.p.h.) divided by 375.

(*g*) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The difference in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage (quoted in these tables to the nearest whole number).

(*h*) These are not the maximum pulls available in the gears (*i.e.*, not the maximum sustained pulls), but the pulls at maximum d.b. power, *i.e.*, at full-throttle at rated engine speed.

Table E—Fuel Consumption, Various Loads, Rated (3rd) Gear

Operating mixture.

Pull. lb.	Speed. m.p.h.	DBHP.	Per cent. of Maximum d.b.h.p.	Slip. %	Fuel. Gall./hr.	Fuel. lb./d.b.h.p. hr.
1,490	4·83	19	50	3	1·9	0·84
1,940	4·78	25	64	3	2·3	0·77
2,440†	4·66	30†	78†	4	2·5	0·68
2,990	4·47	36	93	5	2·7	0·64

† Approximately the rated drawbar load.

(2) Interpretation of Drawbar Tests.

(i) Drawbar tests are carried out on a hard prepared surface. Most field conditions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii) Because of (i) and (ii) above, the drawbar horsepowers available in any gear in the field will usually be less than those shown in the tables.

5. OTHER OBSERVATIONS

(1) Duration of Test.—47½ hours, including running-in.

(2) Repairs and Adjustments.—None.

(3) Engine—

Fuel settings—rich and operating mixtures.

Heat controls—radiator and shutters, thermostat on water by-pass.

Radiator water used—negligible.

Lubrication oil—type used, S.A.E. 20.
Weight to engine, 15.2 lb.;
Weight from engine after tests, 14.3 lb. containing 3.5 per cent. kerosene by volume.

(4) Tractor Weight (lb.).

	Front.	Rear.	Total.
Minimum weight, unballasted	2,080	4,270	6,350
Added weights	70	280	350
*Weight, as usually supplied	2,150	4,550	6,700
Water ballast	....	990	990
Standard weight	2,150	5,540	7,690
Added weight	....	580	580
Water ballast	150	....	150
†Maximum weight, heaviest recommended	2,300	6,120	8,420

* This weight, less driver and fuel, was used in finding centre of gravity.

† Weight of tractor in drawbar tests quoted in this report.

(5) Wheels and tyres.

Tyres.	Front.	Rear.
Type	Rib.	Overlapping open centre bar tread.
Size	7·50 x 16 x 6-ply.	14 x 30 x 6-ply.
Pressure	36 psi.	12 psi.

(6) Steering.—With track widths, front 47", rear 55". Wheel base 76½".

Turning circles: Without brakes, 26' L.H., 26' R.H.; with brakes, 23' L.H., 24' R.H.

Comment: Easy to steer under load, sensitive to steering wheel.

(7) Centre of Gravity, with tractor in standard weight less water ballast and driver.—3½" above, 2' 2" forward of rear axle.

(8) Driver's Accommodation.—*Access to seat,* from back of tractor. *Foot-room and support,* adequate. *Comfort,* seat flexibly sprung, adjustable fore and aft. *Accessibility to controls,* clutch and brake pedals 23½" apart, centre to centre, pedal treads approximately 4" below loaded seat. Parking brake latch under right heel awkward to apply. Handling of gear lever in low gear conflicts with left leg.

(9) Instruments.—All clearly visible, band markings adequate. Indications were consistent throughout tests.

(10) Inspection of Engine and Transmission after Test.—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(11) Instruction Books.—Instructions for starting, running, and maintenance were satisfactory.

G. H. VASEY,
Officer in Charge Tractor Testing.
I. T. NAYLOR,
Tractor Testing Officer.
University of Melbourne.
16th August, 1955.

BRIEF SPECIFICATIONS: International Super AW-6

(Based on Information Supplied by Manufacturers)

(1) Engine—No. AC264 2418. (I.H.C., Australia.)

4-stroke; 4 cylinders, vertical; crankshaft along tractor.

Bore, 4"; stroke 5¼"; compression ratio, 5.05 : 1.

Rated speeds: Belt work, 1,450 r.p.m.; drawbar work, 1,450 r.p.m.

Fuel type: Power kerosene.

Fuel system: Gravity Feed Tank capacity, 17½ gallons kerosene, ¾ gallon petrol.

Air cleaner: Oil bath.

Governor: Centrifugal.

Electrical system: 12-volt battery and generator, coil and distributor.

Starting: Electric starting on petrol.

Cooling: Pressurised water, fan, pump, and thermostat, radiator shutters.

Exhaust: Straight-through type muffler; I.H.C. spark arrester usually fitted.

Lubrication: Oil pump and by-pass filter.

(2) Chassis—

4-wheel; pneumatic tyres.

Wheel base 76½".

Track width: Front 47"; rear 55", adjustable.

Tyre sizes: Front 7.50 x 16; rear 14 x 30.

Steering Gear: Worm and gear.

Weight: Maximum weight, 8,420 lb. (see "Other Observations," Section 5).

(3) Belt Pulley—

Optional; right side, clockwise rotation.

Diameter 11"; face width 7½".

Speed (at rated engine speed), 899 r.p.m.

Belt speed (at rated engine speed), 2,590 ft./min., not in accordance with overseas standards (namely), 3,100 ± 100 f.p.m.). Using 13" diameter pulley should give belt speed approximately 3,060 f.p.m.

(4) Power Take-off—

Optional; guarded; location, centre rear.

Speed: 537 r.p.m., in accordance with overseas standards (namely, 536 ± 10 r.p.m.).

Dimensions: 6 spline, 1⅜" diameter.

(5) Drawbar—Swinging—

Height, as tested, 16", adjustable 8½" to 18".

(6) Transmission.—Conventional gears—

Clutch: Single dry plate; 12" dia.; pedal control.

Gear ratios and road speeds (assuming no wheel slip) on 14 x 30 tyres, at rated engine speed, as advertised:—

Gear.	Forward.					Reverse.
	1	2	3	4	5	
Ratio	139·6	64·8	49·9	41·2	14·8	106·5
Speed, m.p.h.	1·7	3·7	4·8	5·6	16·1	2·3

(7) Hydraulics—Optional, not fitted.

(8) Three-point Linkage—Optional, not fitted.

(9) Spark Arrester—Standard but not fitted. Muffler fitted for test.

UTILITY Implement Sheds

Open-Fronted

Available in Spans of

20ft. : 30ft. : 40ft.

Send for details of our

All-Steel Sheepyards

● Interchangeable ● Adaptable

UTILITY BUILDINGS PTY. Ltd.
Box M942 G.P.O., Perth.

Please forward details and prices of your range of Farm Buildings.
I am interested in a ★Hay Barn, ★Storage Shed, ★Implement Shed, ★Shearing Shed.

NAME .....

ADDRESS .....

.....

- The strongest type of Agricultural Shed on the Market
- "Utility" Implement Sheds are a permanent property asset
- Available Steel Framework only, or with Timber, Sheeting, Fixings

UTILITY BUILDINGS PTY. LTD.
89 ST GEORGES TERRACE PERTH • BF4250 BF1674

MORE PROFIT

FROM FAT LAMBS AND BEEF CATTLE USING THE NEW

Boots

GROMAX TREATMENT

GROMAX is a new product of BOOTS Pure Drug Co. Ltd., manufacturers of the world's largest range of pharmaceutical and chemical products—it is the result of twelve months' intensified research work in Australia and is therefore eminently suitable for Australian conditions.

- **MORE MEAT**
- **LESS FAT**
- **SHORTER GROWING PERIOD**

ONLY ONE TREATMENT NECESSARY

Local experiments and current market values show that for approximately 3d. per head for sheep and 1/- for cattle, the estimated increased return for sheep is up to 9/-, and up to £4 for cattle

GROMAX 'S'—For Sheep
GROMAX 'C'—For Cattle

The **GROMAX** Pellets are implanted under the skin of the ear with the Gromax Gun, which is specially designed for the purpose

For further particulars contact the Western Australian selling agents . . .

LITERATURE COUPON

Please forward literature on
BOOTS GROMAX

Name.....

Address.....

MALLOCH BROS LTD

50-54 WILLIAM ST. PERTH

CAMBRIDGE STREET, LEEDERVILLE
Branch: Cnr. Spencer and Cross Sts., Bunbury

BROOM MILLET

By F. E. RYAN, B.Sc. (Agric.), Agrostologist

Revised from Leaflet No. 799 by H. G. Elliott

THE "straws" in the "straw-broom" found in the average Western Australian household are the seed stalks of the broom millet plant. Supplies of "broom" for the manufacture of household brooms and brushes are purchased from growers in the Eastern States of Australia, particularly from Victoria, but from time to time supplies are scarce. The value of this crop is dependent on the price of broom and in periods of scarcity high prices are paid. It can be grown on summer moist soils in Western Australia and with high prices, can provide remunerative returns per acre.

Broom millet is an annual non-saccharine variety of sorghum, very similar in size to maize, but has much thinner stems and narrower leaves. Male and female flowers occur separately on the one plant and the seeds are borne on long stems which eventually provide the long fibres required for the manufacture of household brooms.

WHEN TO GROW

Broom millet is grown during the summer months on soils which would normally be used for growing maize. Seed should not be planted until all danger of frost is over and the land is sufficiently warm to germinate the seed. September, October and November are satisfactory months for planting in the higher rainfall areas with a later planting in the districts further south.

SOIL PREPARATION

For best results, the ground must be thoroughly prepared to a depth of about five inches and worked to produce a firm seed bed similar to that required for maize. Ploughing should commence early in the spring before the land has dried out, and subsequent working can be done with a disc cultivator, harrows and if available, a roller. Weeds must be destroyed during these cultivations.

SEEDING

The rate of sowing varies with the type of country on which the plants are grown and also on the row spacing which is adopted. Normally a seeding rate of 2 lb. per acre is considered satisfactory. Rows should be spaced 21 to 35 inches apart, according to the equipment available for planting and inter-row cultivation after the plants are up. In choosing a spacing of 21, 28, or 35 inches, this can be readily achieved by drilling, providing that every third, every fourth, or every fifth run of the drill only is used and the remaining holes are blocked up. In the rows, plants should be spaced between 4 and 12 inches apart using a closer spacing where moisture conditions in the soil during summer are most satisfactory or under irrigation.

FERTILISER

This crop requires adequate quantities of nitrogen and potash with phosphorus for maximum growth. Generally 2 to 3 cwts. per acre of superphosphate are needed and on most soils, 1 cwt. per acre of sulphate of ammonia or its equivalent in nitrate of soda is recommended. In addition to these, potash deficiency has been demonstrated on many of our soils in the higher rainfall areas and where potash deficiency is suspected, an application of 1 to 1½ cwts. per acre of muriate of potash is recommended.

BENDING AND TABLING

The upright fibres carry the seeds at the top, and are very prone to spread from the weight, and may bend over if the seed crop is heavy. This results in twisted and bent fibres which are undesirable. To avoid this, a practice of bending the stalks so that the heads are allowed to hang down vertically is frequently adopted. The stems are bent at a point 9 to 12 inches below the base of the seed stalks and it

Fig. 1.—On the right is shown a head of broom millet bent correctly by hand. Note the fibres hanging straight down in compact formation. On the left, the heads have been bent over by the weight of the seed. The stalks have been separated and twisted

may be necessary to bend the stem in two places so that too sharp a bend does not fracture the stem.

Another technique which is used for harvesting broom stalks is known as tabling. By walking backwards between two rows and bending the stalks across one another so as to form a table about 3ft. high with the seed heads hanging over the edge of the table, the process of cutting off the heads becomes much more simple. If the crop grows to a height of 9ft. or more, this practice is usually adopted.

HARVESTING

Harvesting is carried out by cutting or pulling according to the varieties grown. About 10 to 14 days of man labour are required in America to harvest, cure, thresh and bale a ton of cured brush. A ton of cured brush contains 40,000 to 70,000 heads, and each brush or head must be pulled or cut separately.

The brush turns from pale yellow to green before maturity and should not be harvested until the whole brush from the tips down to the knuckle is green. If harvested whilst the fibres are still yellow they will be weak and flabby at the bottom. The seeds are at about milk stage when ready to harvest. Four or five days after this stage the brush gets over-ripe and begins reddening. Where a large area is to be harvested, almost invariably some of each quality will be obtained as the heads last harvested will be mature. At this stage the fibre is a straw or flesh colour, and is a little inferior in quality. In normal seasons it will be found that this quality sells as readily as the prime, and the value of the seed as poultry feed more than makes up any loss.

Where only a small area is grown it is recommended to harvest the crop just before the seed is mature, thus obtaining a prime article.

The actual harvesting should be carried out in warm dry weather, as if stacked while damp, the fibre becomes discoloured in a very short time.

This State is admirably suited from a climatic viewpoint for the growing of this crop, as our conditions for harvesting are usually good.

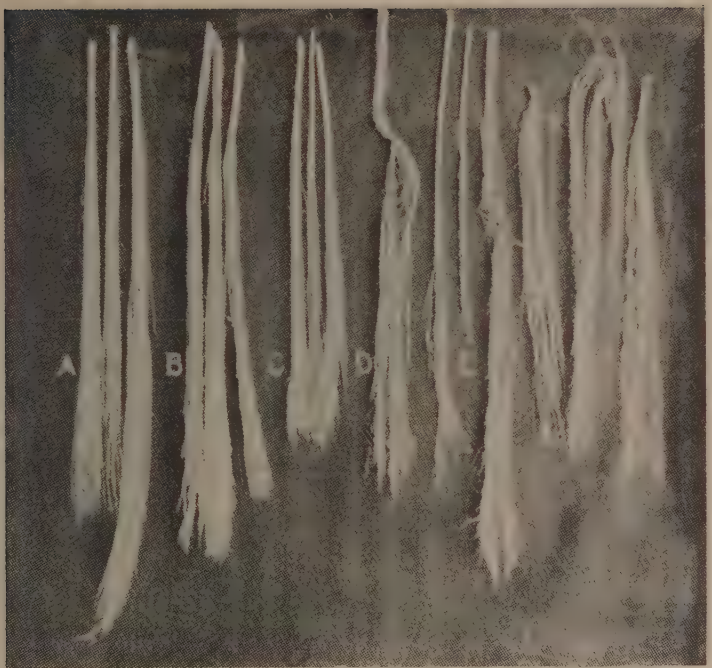


Fig. 2.—Samples of broom millet heads ranging from prime (A and B) to rubbish (D to F)

During the harvesting, the sheath enclosing the base of the brush should be removed at the time of cutting as this facilitates drying, and deprives aphidae of shelter. These insects are almost invariably found in crops of millet.

DE-SEEDING

After the brooms are removed from the plants, the seeds must be removed from the fibres by threshing or hackling. The most satisfactory method is by a wooden roller 12 to 18 inches in diameter and approximately 2ft. long. Four-inch or six-inch nails are driven into this wooden roller in rows arranged diagonally across the roller with the rows spaced about six inches apart. On the "intake" side of the roller, the nails are placed about five inches apart and are placed progressively closer together as they approach the other end until at that end, they are spaced 2½ inches apart. The roller is rotated at a speed of approximately 300 to 400 revolutions per minute and the brooms or hurls as they are called, are held in the hands and worked across the roller to thresh off the seed. Four or five hurls can be threshed simultaneously.

CURING

Threshed green brush placed in the shed, loses about half of its weight in the form of evaporated water before the brush is dry enough for baling. This requires 10 to 14 days under ordinary conditions but longer if the weather is damp. Brush left longer than 24 hours in the field is likely to become bleached, otherwise the longer it is left in the field, the shorter is the curing period.

The brush is placed on the slats within the shed in layers 2 to 3 inches thick. If piled too thickly it becomes "shelf burnt" and discoloured on account of heating.

Curing is sometimes done in ricks but this material is usually poorer in quality, bleached and sometimes discoloured by rain. Under favourable conditions it may be of excellent colour and appearance. Ricks are 3 to 5 feet high and 4ft. wide at the bottom and tapering upwards. The seed ends are placed outwards.

GRADING

It is important that the farmer grades his broom millet brushes carefully according to market types. Green coloured brush should be segregated from the golden-coloured brush and each classed into appropriate grades. The ideal brush is approximately 17in. long, straight and with the fibres pressed closely together. In grading the material these long straight brooms can be baled separately from the loose and short brooms and from the "turnovers" and "insides." This type of grading is shown in the illustration with best grades at A and poorest grades at F.

BALING

The various grades should be baled separately and all seed removed. In placing the brushes in a press, care must be taken to protect the fibres. The brush is laid with the butt ends outwards and the heads overlapping in the middle. Battens may be placed on the top and bottom of the bales and when pressed, tied with at least three strands of No. 10 wire. A bale of 36in. long by 18in. deep by 30in. wide, weighing approximately 112 lb. is usual and satisfactory.

YIELDS

Yields range from 8 to 15 cwts. per acre of good fibre on non-irrigated land with best results on fertile soils which are well supplied with moisture during the summer months. Under irrigation, higher yields than this could be expected.

At the present time prime hurl or broom is valued at £160 or £170 per ton. In addition, the seeds which are threshed from the broom may be sold as stock food. The portion of the plant which is left in the field after harvesting can be chaffed for roughage for stock or may be burnt to destroy any pests which may be present.

The "Treeclearer" Powersaw is of solid tubular steel construction. Guaranteed to be of first class materials and workmanship throughout. Fitted with powerful efficient self-drive, operating on both wheels for ease of movement in the roughest country. A range of machines is available fitted with engine from 5 h.p. to 15 h.p.

ATTACHMENTS MAKE THE TREE-CLEARER A COMPLETE FENCING OUTFIT

FARMERS, GRAZIERS!

Vital to Progress—

PORTABLE CIRCULAR SAW AND ATTACHMENTS

POST HOLE DIGGER
Digs 10in. Hole to 3ft. Depth

SEND NOW FOR—

GEORGE MOSS PTY. LTD.

BOX R1288 G.P.O., PERTH — TELEPHONE W2371
OFFICE AND WORKS — 10 WOOLWICH ST., LEEDERVILLE

FREE CATALOGUE

REARING ORPHAN PIGLETS

By A. W. WILLIAMS, B.V.Sc., Government Veterinary Surgeon

WHEN a newly-farrowed sow succumbs to accident or disease, or is unable to produce sufficient milk for the litter, the pig-raiser may be faced with the problem of hand-feeding the young pigs. If it is possible for the piglets to obtain colostrum (often known as "first milk" or "beastings") during their first two days of life, their chance of survival will be increased and they may be reared successfully on cow's milk.

If two or more sows farrow at approximately the same time, the orphan piglets may be placed with a foster-mother for two days to ensure that they receive colostrum.

Where this is not possible, a substitute for colostrum may be prepared by whisking a raw egg into each quart of cow's milk (whole). This mixture should be fed for at least a week.

FEEDING

Scrupulous cleanliness should be observed in feeding baby pigs. The utensils should be scalded thoroughly before and after use and for this reason only sound enamel, glass, or glazed earthenware dishes should be used.

The milk should be fed at body temperature and should not be diluted. If shallow dishes are used, the pigs soon learn to drink if their noses are pushed gently into the milk. Apropos of this, it will be found that "up-ending" the young pigs and dipping their noses into the milk is a surprisingly efficient method of teaching them to drink.

"Little and often" is the best motto for feeding. Overfeeding especially during the first week of life leads to digestive troubles, and the recommended routine is to give five or six small feeds daily for the first fortnight after which the frequency can be reduced to three feeds a day.

Vitamin supplements such as Vetemul, and antibiotics such as Terramycin should be added to the milk in accordance with the manufacturers' instructions. The antibiotic supplements are particularly desirable, not only to assist in growth development but to combat infections such as virus pneumonia.

Some farmers add sugar at the rate of two tablespoonfuls to each quart of milk, This may be helpful in preventing the so-called "baby pig disease" which is considered to be due to a drop in blood sugar levels. Any changes in the composition of the food should be made very gradually.

WARMTH IS ESSENTIAL

Baby pigs should be kept warm, preferably in a box with ample dry bedding. Draughts and chills must be avoided and some form of artificial heating is advisable if the night temperatures are liable to drop sharply.

A disused poultry hover, or a suitably-protected hot-water bottle or hot brick will help to maintain night temperatures at a safe level.

MILK SUBSTITUTE

Where adequate supplies of cow's milk are not available, dried buttermilk may be substituted. One pound mixed with a gallon of water will give a fluid which can be used to replace whole milk.

Some form of solid feeding should commence when the piglets are about two weeks old.

A dry mash containing four parts of cracked grain and one part meatmeal should be made available in a separate trough from the milk. The pigs should

also have access to a trough of clean water. Green grazing is very desirable at all times.

The cracked grain should be increased at the rate of ¼ lb. per week per pig so that at weaning age (8 weeks) the pigs should be receiving 1½ lb. grain per day.

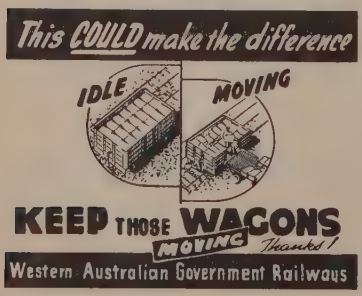
The milk supply is gradually decreased after three weeks so that after weaning the pigs can start straight on to dry mash and water. With the decrease in milk the vitamin and antibiotic supplements can be added to the mash.

It may be advisable to incorporate a mineral mixture into the mash after the piglets have been consuming it for some days. A suitable mixture would be four parts limestone to one part salt. About 1 oz. should be available for each pig.

PRIMARY PRODUCERS!

Railway wagons are YOUR ASSETS

DON'T WASTE THEM



PROMPT LOADING and UNLOADING means quicker turnround of wagons.

QUICKER TURNROUND means increased effective wagon loading capacity.

INCREASED CAPACITY means faster and better railway service for all.

BETTER SERVICE is our aim and **your** need. YOU CAN HELP yourself by helping Railways to keep the wagons moving.

- USE Government Railways **Insured Parcels** and **Cash on Delivery Parcels** systems
- ALSO, consign your goods at "Commission's Risk" and safeguard yourself

WESTERN AUSTRALIAN GOVERNMENT RAILWAYS

OATS and VETCHES

Show Their Worth at Bridgetown

By A. W. HOBBS, B.Sc. (Agric.), Agricultural Adviser

AN excellent fodder crop yielding almost 4½ tons of hay per acre was grown on a property at Bridgetown during 1956. This crop was grown for demonstrational purposes and many farmers in the Bridgetown district have been interested in it as they passed along the road. Some details concerning this crop, therefore, may be of interest to those farmers.

The demonstration was carried out on the property of Mr. L. Beard of Bridgetown and is one of a number of demonstrations which have been arranged throughout the dairying areas over the last seven years.

Oats and vetches are particularly valuable as a cleaning crop preceding the sowing down of pasture species. The combination of vetches with oats provides a hay crop which is more valuable in its protein content than a crop of oats. The seed mixture consists of 60 lb. of Algerian oats and 15 lb. of purple vetch per acre. Algerian oats are chosen because they most nearly match the vetch in the rhythm of their growth, both species growing most rapidly towards the end of the spring.

The area on which this demonstration was carried out has been cleared for a number of years. It originally carried redgum with some jarrah. The soil is a red loam which is typical of a considerable area in the Bridgetown district. Although the area had been down to subterranean clover pasture for a number of years, the pasture had commenced to run out and was somewhat low in production and the demonstration was arranged as the first stage before seeding down to pastures in 1957.

An area of two acres was scarified "in the dry" during March to loosen the surface of the soil and allow easy penetration of the early rains. This was very successful and weeds germinated quickly. They were cultivated with the tandem disc implement, and the area left in fallow for four weeks when it was again disced to kill a further germination of the weeds. A third discing took place during April and then between the end of May and June 12, the area was harrowed several times at intervals to give a good clean seed bed with a firm tilth.

Seed and fertiliser were sown broadcast on June 12, and harrowed in. Vetch seed was inoculated with culture. Both the oats and the vetches germinated rapidly and a very good germination was noted by July 1. By August, a good stand of oats and vetches had been obtained and was making vigorous growth. The area was almost free of weeds. The crop finished off well and contained a good mixture of oats and vetches. It was mown on December 12 to give a yield of 372 bales with an average weight per bale of 53 lb. each, that is almost 4½ tons per acre of hay.

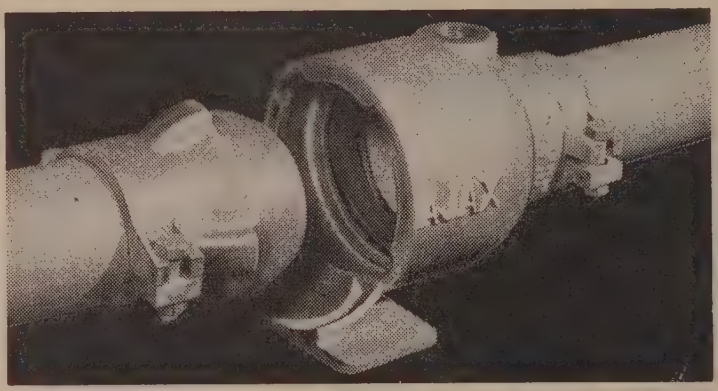
During the growth of the crop, any weeds which appeared were successfully choked out and the land is in good condition for an early harrowing and seeding to pasture during the autumn of this year.

From experience on Research Stations, mixtures of oats and vetches which contain a high proportion of vetch are capable of giving high protein contents in hay and frequently protein levels at least twice that of an ordinary hay crop have been recorded.

With the excellent yield of 4½ tons per acre, Mr. Beard feels that he has been well repaid for the care and attention he put into preparing for this crop and in addition, his paddock was left in excellent condition for sowing down to pasture in 1957.

AJAX IRRIGATION EQUIPMENT

ARE YOU IN DOUBT?



AJAX IS THE ANSWER

THE MOST MODERN ROBUST LIGHTWEIGHT COUPLING COMBINING ALL THE GOOD FEATURES OF EXISTING COUPLINGS PLUS ADDITIONAL REFINEMENTS

FEATURES

A. Can be coupled or uncoupled from the standing position at the point of balance.
B. Extreme flexibility—32 deg. at each joint—follows contours and around corners easily.
C. Seals when pressure rises.
D. Guaranteed to drain quickly instantly pressure drops.
E. Any Pipe can be removed without disturbing the others.
F. Designed not to leak, jam or wear.
G. No Springs, Clamps, Clips or Latches.
H. Can be readily attached to any standard aluminium pipe on your property, and is available to replace the old style couplings fitted with troublesome springs, latches or clips.
I. May be used with any type of sprinkler.
J. Available with Towing Skids, Wheels or Stands.
K. This most economical Irrigation Coupling is now available from YOUR LOCAL HARDWARE STORE.

McPherson's LTD.

532 MURRAY STREET, PERTH. BA 9711
And at MELBOURNE, SYDNEY, BRISBANE, ADELAIDE

ORGANISED VERMIN CONTROL

By A. R. TOMLINSON, Chief Vermin Control Officer

THE struggle between man and his animal enemies is never-ending. It commenced when our early forefathers battled for existence. It continues now, and no doubt will go on indefinitely. Here in Western Australia, our primary industries would be ruined, and our homes rendered uninhabitable if we did not fight unceasingly against the larger animals and the insects.

In any warfare, carefully planned and co-ordinated campaigns are required. Our fight against animal pests is all-out warfare, and nowhere else are the advantages of such planned and co-ordinated campaigns more clearly shown.

Perhaps the most outstanding illustration of this has been in the Argentine ant campaign here in Western Australia. To commence with, property owners operated individually against the ants on their properties. As is usual under these conditions some did a good job, others made ineffective or token efforts while others did nothing. Just as could be expected following our experience with similar operations against rabbits, the ants continued to spread to an extent which caused general alarm.

CO-ORDINATION GETS RESULTS

Then a centrally organised and completely co-ordinated control plan was substituted for the existing individual efforts. The work was done by teams of trained men who, operating on a front, treated all neighbouring properties simultaneously. The net result—immediate satisfactory control.

Here indeed is a practical example to all farmers and Vermin Boards of the application of a principle which although so well known, is so little used.

For many years the Vermin Control Branch has tried to persuade farmers and local authorities to use this method to control pests such as rabbits and wild dogs, but with little success. It was also recommended by some individuals such as the local inspector in the Manjimup Vermin Board and the present secretary of the Dowerin Vermin Board. More particularly is was recommended by the Royal Commission into Vermin Control in Western Australia.

RABBIT CONTROL WITH "1080"

The Agriculture Protection Board had already commenced such a scheme from several angles, including the mass spreading of myxomatosis, the rabbit control units using "1080," the rabbit warren destruction units, the Group Vermin Control Officer scheme, and the grasshopper control programmes.

All had the one objective—co-ordinated and organised control which extended simultaneously over neighbouring properties. All have been successful, and never before in the history of this State, have rabbits received such a severe setback from the hands of man.

The Protection Board, with the assistance of many local authorities and farmers, has demonstrated that rabbits can be effectively controlled by organisation and co-ordination.

The poison "1080" is now available to farmers in the form of poisoned bait. This could be a great help if applied properly. If it means that farmers are going to use it as they have used poisons in the past, it will be largely wasted. Some will use it well, but individually. Some of their neighbours may use it just as well but not simultaneously; others will use it inefficiently and others will do nothing. There can be only one result—failure to achieve maximum control.

The most important point which has emerged from our use of the "1080" poisoning units is that, while the poison is better than others, it has a greatly reduced effect without the organised and co-ordinated drives.

ORGANISATION IS ESSENTIAL

In Vermin Board districts where the drives have been well-organised in advance so that all properties and reserves are dealt with simultaneously on a front, by far the best results have been obtained. Where the advance arrangements have not been so well organised, the effectiveness has been proportionately reduced.

Our work has shown that a competent local Group Vermin Control Officer or Inspector is essential to arrange for an organised drive. He must be backed up with teams of men and equipment, preferably to help farmers with control work or to do it for them. Farmers who will not co-operate must be compelled to carry out effective work, or it will be done for them under penalty conditions. The whole keynote is efficient and simultaneous action on neighbouring properties, and by this is not meant within a fortnight or a week, but at the same time.

Despite the remarkable results which have been achieved by organised control work with both rabbits and Argentine ants, some Vermin Boards and farmers have not yet learned the lesson which has been so strikingly taught.

Only recently, the members of one Vermin Board informed me that while the use of our units might be good, it was not always convenient for farmers to destroy rabbits at a given time. They felt it would be better to allow the farmers to operate when it was suitable for them to do so.

This is the method which has been such a failure over the years. It cannot be effective, and until this particular Board is prepared to follow the lead which has now been given in up-to-date control work, satisfactory control of the rabbits cannot be gained.

The same applies to those farmers who have pressed for the use of the poison "1080" solely by farmers individually instead of in organised drives.

PASTORALISTS' PROBLEMS

In other fields of vermin control, organised drives are having equally good effects. In the pastoral areas, I have continually requested Vermin Boards and pastoralists to organise district-wide wild dog baiting drives simutaneously with the Agriculture Protection Board's aerial baiting campaigns.

Some pastoralists in the North-West are now co-operating on a large scale. One group covers part of the Port Hedland, Roebourne and Tableland, Marble Bar and Nullagine districts. Another covers parts of the Meekatharra, Ashburton, Upper Gascoyne, and also the Nullagine districts.

Campaign committees, assisted by Protection Board Regional Vermin Control Officers, have been set up, and well-planned campaigns organised with local supervisors co-ordinating activities. Teams of men from the stations operate in conjunction with Protection Board doggers in wholesale baiting drives which have already given excellent results.

The drives have been so successful that they are to be continued, and it is hoped they will be extended. So far the Vermin Boards have not actively participated in their official capacity, but no doubt they will do so. When they do, it will be possible for a more complete coverage to be obtained, and those few stations which do not co-operate will be included.

The general attitude by many pastoralists and farmers has been to leave wild dog control largely to the Protection Board doggers. It is a very encouraging sign to see that those joining in these drives have appreciated that this is not enough, and co-operative action by all concerned is necessary. I congratulate them on their positive and progressive attitude.

KANGAROO POISONING

The Vermin Control Branch has been investigating the problems associated with kangaroo control for some years. It has already been discovered that the wallabies along the Fitzroy River in the Kimberleys are controllable by poisoning under certain favourable conditions. Once again,

however, the same principle applies. Until some method is devised for arranging and enforcing simultaneous drives on all stations concerned, the wallabies will continue to be a menace. Investigations are continuing with other kangaroos, but whatever measures are discovered, the organisation of the application is the ultimate problem.

The employment of Vermin Control Officers to supervise and organise grasshopper control work in the northern and eastern agricultural areas immediately resulted in the most effective control achieved to-date. The contrast between the old style independent efforts of the farmers—no matter how effective they were individually—and the present organised scheme is so striking that no-one could possibly doubt the superiority of the co-ordinated work.

There has been a great awakening to the necessity to control vermin. It has been shown that rabbits may eat 85 per cent. of the pastures; on some stations there are many more kangaroos or donkeys than sheep or cattle; on other stations the lambing percentage is controlled directly by the extent of fox baiting drives. If every farmer or pastoralist is left to operate as best he can, these losses will continue. That organised control work is essential has already been adequately proved. I sincerely hope that these demonstrations have been closely observed, and the lessons provided learned. Only by well-organised drives can effective vermin control be achieved.

Book Review

SHEEP SHEARING EXPERTING

WOOL, and its production, both for local use and export, has grown from very humble beginnings in the early years of Australian history to such an extent that it is now the greatest single contribution to the economic stability of the Commonwealth. One of the factors that has made wool production, on such a large scale, possible, is the production of modern machinery, which allows the vast army of skilled men, who are employed in the industry, to shear the wool from the 130 million sheep depastured throughout the various States of Australia.

In compiling a text-book on sheep shearing machinery and its maintenance, Mr. L. D. Ryan, Teacher of Sheep and Wool, and Sheep Shearing Experting, at the East Sydney Technical College, has made available a much needed work on the specialised knowledge of how the machinery may be maintained at the peak of its efficiency. In the early part of the book is a most interesting chapter on the teething troubles of the early shearing machines. He then deals extensively with every phase concerning the installation of the modern machinery in general use today.

In dealing with the grinding of combs and cutters, the author has gone to great lengths accurately to describe the technique, and on this score alone the book is well worth the purchase price.

Other chapters deal extensively with maintenance of handpieces, the care of the transmission belts and their successful operation, together with the power plants.

The book also deals with the new method of shearing sheep, using the shearing table. It is a particularly well-written publication containing a wealth of information on the functional components of the shearing plant, and the rectification of the faults that develop in it from time to time.

It contains a complete index for reference and is amply illustrated both photographically and with "line drawings" and is a book that should prove of valuable assistance to the shearing expert, the sheep-owner, the professional shearer and to those about to take up shearing.

"Sheep Shearing Experting"' is by L. D. Ryan, and is published by Angus and Robertson. Price 45s.—M.B.

Your own grain storage saves time-money

- Heavy gauge galvanized steel sheets
- Easily erected — permanent
- Rodent and weatherproof
- Hinged type bag holder on 1000-8500 Bushel Silos
- Steel earth rings and loading platforms available as extras if required
- Prompt delivery

LYSAGHT

Grain Silos AND AUGERS

EARTH RING

An earth ring, which is an extra ring of corrugated steel sheets filled with earth or sand, is a most effective and economical method of erecting an elevated base for your Lysaght Silo. The use of an earth ring reduces the risk of underground seepage. Full details are available on request.

AUGERS

A completely new type grain auger is now available to fill and empty Lysaght Silos. Outstanding features include:

- *Unique centre drive unit (Patent pending No. 22636/56).*
- *Improved capacity.*
- *All working parts completely encased.*
- *Adjustable chute tube.*

PRICES (EX FREMANTLE STORE)

200	Bushel Silo		£54
500	,, ,,		£87
1,000	,, ,,		£154
2,000	,, ,,		£236
2,000	,, ,,	(Squat)	£236
3,000	,, ,,		£306
3,500	,, ,,		£333
4,500	,, ,,		£511
8,500	,, ,,		£788

DISTRIBUTED IN WESTERN AUSTRALIA BY:—

Dalgety & Co. Ltd., Perth
Elder Smith & Co. Ltd., Perth
Goldsbrough, Mort & Co. Ltd., Perth
Katanning Stock & Trading Co. Ltd., Katanning
Harris, Scarfe & Sandovers Ltd., Perth
McLean Bros. & Rigg Ltd., Perth
R. A. Reilly & Co., Narrogin
Westralian Farmers' Co-operative Ltd., Perth

MANUFACTURED BY—

JOHN LYSAGHT (AUSTRALIA) PTY. LTD.—FREMANTLE or Lysaght's Works Pty. Limited, Newcastle Works, N.S.W.

The Sudan grass plots described in the article. This photograph taken on January 28, 1957, shows W.A. Commercial strain on right and S.S.6 (sweet variety) on left.

CUT OR GRAZE YOUR FODDER CROPS EARLY

Some Notes on the Nutritional Value of Sudan Grass at the Bramley Research Station

By L. C. SNOOK, D.Sc., Animal Nutrition Officer

MOST farmers are aware that fodder crops deteriorate in quality as the plants mature. It is equally well known that, if crops are allowed to run to head, a much greater bulk of material is obtained. The farmer, therefore, has to choose between quality and quantity. As quantity is a much more obvious factor and bulk seems to mean so much in terms of pounds, shillings and pence, there is a tendency to cut or graze crops too late rather than at the best time.

Measurements made on a crop of Sudan grass grown at the Bramley Research Station this summer provide some interesting information and illustrate the importance of early harvesting of forage crops.

The Sudan grass was planted on pasture land which was ploughed on November 5, 1956, and thoroughly cultivated. The seed was sown through a drill (12 lb. per acre) with one bag of Potato Manure B. per acre. By January 2, 1957, the crop was four to five feet tall, at which stage it should have been strip-grazed or cut for hay. Samples were collected for analyses and as shown in the accompanying table the herbage had a high food value being rich in protein and minerals, and containing comparatively little crude fibre.

The Sudan grass was left until January 30, 1957, before it was cut. As can be seen from the illustration at this stage the crop looked most impressive, being a dense mass of slender canes, eight to ten feet in height and just coming into full flower.

But much of the value of the fodder crop had been lost. The table of analyses shows that the protein content had fallen from 14 per cent. to 6 per cent. in a matter of 28 days. The useless fibre had increased by 10 per cent. while the phosphate level had been halved. What was even more

TABLE OF ANALYSES

SUDAN GRASS HAY—BRAMLEY RESEARCH STATION.

Composition as a Percentage of the Dry Matter.

Date of Cutting.	Crude Protein.	Crude Fibre.	Crude Fat.	Carbo-hydrate.	Calcium as Ca.	Phosphorus as P.
2–1–57 (Compound sample)	14	25	2	51	0·5	0·22
30–1–57 (W.A. Commercial seed)	6	35	1	53	0·3	0·09
30–1–57 S.S.6 (Sweet variety)	6	34	1	54	0·3	0·10

serious, the crop made very little regrowth after cutting whereas the plants which were cut on January 2, stooled very well despite the absence of rain.

This example illustrates the folly of sacrificing quality for quanity. Even if only one cut is to be expected, a smaller yield of young material is to be preferred to the greater bulk which is obtained from a more mature crop. This principle is particularly important in a crop such as Sudan grass which has an excellent facility for stooling and regrowing following grazing or cutting.

DAHLIA

BULBS

Available from

MID-OCTOBER ONWARDS

All the Latest and Best Varieties in . . .

Decorative
Cactus
Hybrid Cactus
Miniatures
Charms
Pom Poms

Write for List which is Free and Post Free

Strong Seedling Gerberas in Pots @ 18/- dozen. Freight extra

Seasonal Flower and Vegetable Seedlings now ready

WILSON & JOHNS Pty. Ltd.

74 Barrack St. Perth BF 3048

102 High St. Fremantle L 2447

Nurseries: CANNINGTON, FREMANTLE, SPEARWOOD

Fertiliser Trial

WITH POTATOES AT MANJIMUP

BY

T. WACHTEL,

B.Sc., (Agric.)

VEGETABLE ADVISER

THIS trial was one of a series to be carried out by the Vegetable Section of the Department of Agriculture, with the objective of determining the most economical applications of nitrogen, phosphate and potash fertilisers for potatoes in the important potato-growing areas of the State. The results are discussed in this report. On the site chosen at Manjimup, highly significant responses were obtained from increasing levels of phosphate and nitrogen. It is indicated that potash, over a certain level, had a depressing effect on the yield.

The correct use of commercial fertilisers is one of the most important factors influencing the efficiency of potato production as fertilisers form a major part of the total production costs.

Complete commercial fertilisers (for example Potato Manure "A" or "E") contain all three of the major plant nutrients, nitrogen, phosphate and potash in various proportions. It is quite possible, however, that some of the components in the mixture will be in excess of what the crop requires, or some may be inadequate. Both cases will involve some waste, not only because of unnecessary expense, but also by the adverse effect on the yield when the proper balance of these nutrients in the soil is upset. The relative quantities necessary will be determined by the composition of the soil and the specific requirements of the crop.

To determine the fertiliser practice which would produce the most economical yield, precise information from properly conducted experiments has to be obtained as to the best materials to use and their optimum rates and combinations. As the responses of the crop will be different in different types of soil, the experiments have to be laid down, as far as possible, with due regard to soil type in order to give reliable information. Field trials offer the most satisfactory way of determining the extent and nature of the deficiencies of nutrients in a soil for any particular crop.

The first of these trials has been completed, and the results are presented in this report. As, however, this experiment was only conducted for a single season, it would be unwise to draw detailed conclusions from the results until the indications given by this experiment are further tested. It is hoped, that eventually all soil types will be covered in different production areas, so that more precise recommendations can be given to growers.

In this experiment, nitrogen, phosphate and potash were used at different levels and in different combinations. Nitrogen was given in sulphate of ammonia (20.5 per cent.), phosphate in the form of superphosphate (23 per cent.) and potash in the form of muriate of potash (58 per cent). These fertilisers were used at the following rates:—

Sulphate of Ammonia—1½, 3, 6 cwts/acre.
Superphosphate—3, 6, 12, 24 cwts./acre.
Muriate of Potash—1, 2, 4 cwts./acre.

These rates combined allow of a total of 36 combinations, that is complete mixtures with varying rates of each fertiliser

Fig. 1.—The experiment in the early stage, with plots pegged out

element. Thus, for instance, 1½ cwt. of sulphate of ammonia may be combined with 3, 6, 12 or 24 cwts. of superphosphate, and any of these combinations may again be combined with either 1, 2 or 4 cwts. of muriate of potash. These different fertiliser treatments were applied to separate plots, and the yields from these plots were harvested and weighed spearately. The arrangement of the plots was such as to allow the yield data to be analysed statistically by appropriate methods. These methods also make it possible to determine which fertiliser component in the mixture was responsible for the increase in yield.

The experimental plots were planted in mid-September on the property of Mr. C. V. Horne at Middlesex. It covered about three quarters of an acre. The soil was of the red karri loam type, and was under pasture for the last five years topdressed with about 1½ cwt. of superphosphate yearly, except in 1953-54, when it was sown to peas and grazed by pigs. The crop was irrigated as required, and no topdressing was carried out. The results are tabulated in this article, and are also illustrated in a diagrammatic form. Yields on an acre basis varied between about 6½ and 19½ tons according to different treatments.

Superphosphate.

This fertiliser was applied at the rates of 3, 6, 12 and 24 cwts. per acre. Highly significant responses were obtained from increasing rates of application. There were indications that even higher levels could profitably be used, the limit being set by the price of superphosphate in relation to the price of potatoes. It may be noted, however, that although yield differences were highly significant at each additional application of superphosphate, these differences fall off gradually towards the highest level, that is 24 cwts. per acre.

Sulphate of Ammonia.

Applied at the rates of 1½, 3 and 6 cwts. per acre. Highly significant increase in yield resulted from increasing the rate from 1½ to 3 cwts. per acre, and a somewhat lower, but still significant increase from a further increase to 6 cwts. per acre. It will be noted from the tables and diagrams, that no increase in yield resulted from increasing rates of applications of sulphate of ammonia at the lowest level of superphosphate (3 cwts.), but when the rate of superphosphate was increased, good responses were obtained from increasing applications of sulphate of ammonia. There were indications, that even higher rates could profitably be used in conjunction with increasing levels of superphosphate.

Muriate of Potash.

Applied at the rates of 1, 2 and 4 cwts. per acre. No yield increases were obtained from increasing levels of muriate of potash at any level of superphosphate or sulphate of ammonia. When the rate of

Fig. 2.—At a later stage, with differences due to treatments showing up. The plot in the top right-hand corner is one of the high phosphate-high nitrogen treatments

application was increased from 2 to 4 cwts. per acre, a significant decrease in yield resulted. No definite explanation of this decrease can be offered at this stage, until the causes are further investigated.

The following tables and diagrams show the overall effects of the three components in the fertiliser mixtures, and also their interactions with each other in producing their effects on the yield.

ACKNOWLEDGMENTS

Grateful acknowledgment is made to Mr. C. V. Horne, on whose property the trial was conducted, for his willing co-operation and assistance with both labour and machinery.

Acknowledgment is also made to officers of the Plant Research Division of the Department of Agriculture, for carrying out the statistical analysis of the results.

Table 1.
OVERALL EFFECTS OF THE THREE COMPONENTS.

		Yields of first-grade potatoes, to the nearest half ton.	Yields relative to lowest application as 100.
Superphosphate, cwts./acre	3	8	100
	6	12	150
	12	15	188
	24	17	213
Sulphate of Ammonia, cwts./acre	1½	11½	100
	3	13	113
	6	14	122
Muriate of Potash, cwts./acre	1	13½	100
	2	13½	100
	4	12½	93

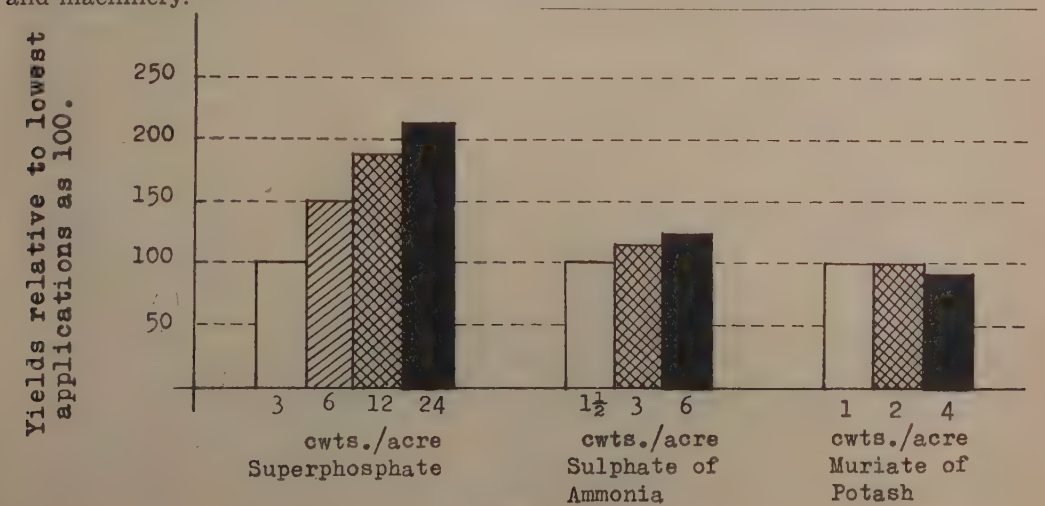


Table 2.

EFFECT OF THE RATE OF SUPERPHOSPHATE ON YIELD RESPONSES TO SULPHATE OF AMMONIA.

Absolute yields per acre, to the nearest half ton.

		Sulphate of Ammonia, cwts./acre.		
		1½	3	6
Superphosphate, cwts./acre	3	7½	8½	7
	6	10½	12	13
	12	12½	15	17½
	24	16	17	19

Yields relative to lowest rate of Superphosphate and Sulphate of Ammonia as 100.

		Sulphate of Ammonia, cwts./acre.		
		1½	3	6
Superphosphate, cwts./acre	3	100	113	93
	6	140	160	173
	12	167	200	233
	24	213	227	253

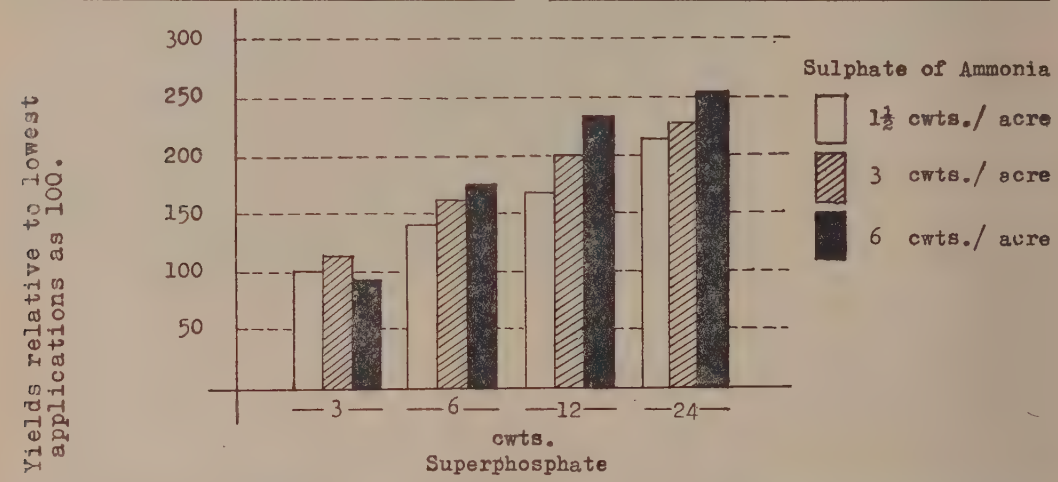


Table 3.

EFFECT OF THE RATE OF MURIATE OF POTASH ON YIELD RESPONSES TO SUPERPHOSPHATE.

Absolute yields per acre, to the nearest half ton.

		Muriate of Potash, cwts./acre.		
		1	2	4
Superphosphate, cwts./acre	3	8	8½	7
	6	12½	12	11
	12	15½	15½	14
	24	17	17	17½

Yields relative to lowest level of Superphosphate and Muriate of Potash as 100.

		Muriate of Potash, cwts./acre.		
		1	2	4
Superphosphate, cwts./acre	3	100	106	88
	6	156	150	136
	12	194	194	175
	24	213	213	219

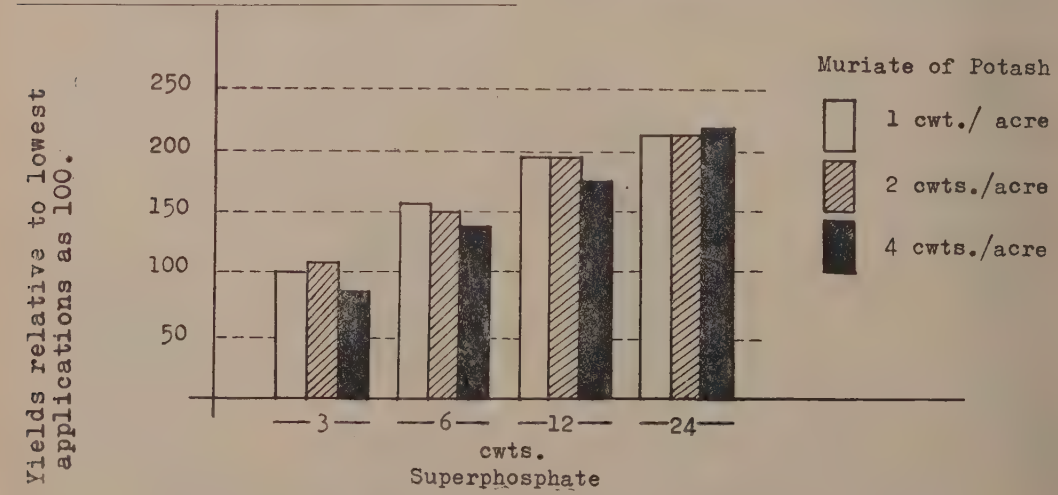


Table 4.

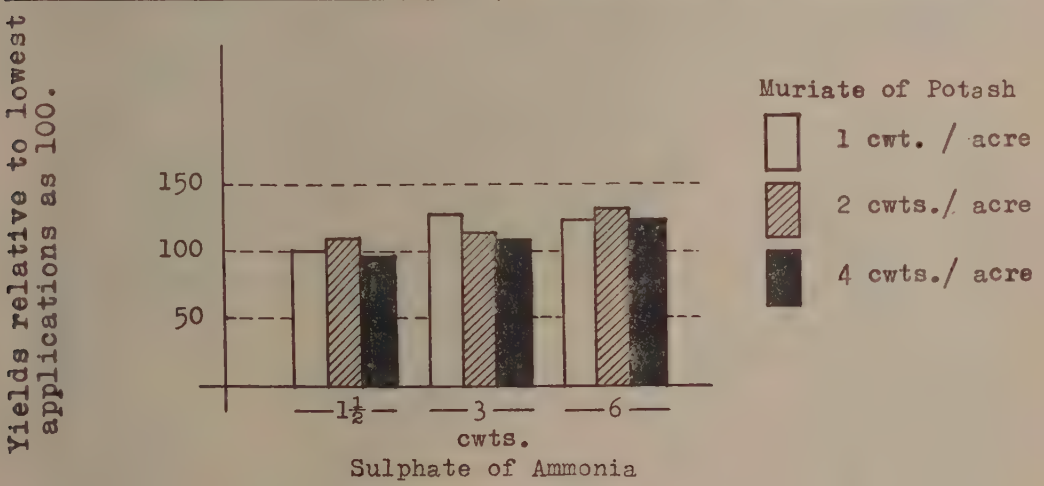
EFFECT OF THE RATE OF MURIATE OF POTASH ON YIELD RESPONSES TO SULPHATE OF AMMONIA.

Absolute yields per acre, to the nearest half ton.

		Muriate of Potash, cwts./acre.		
		1	2	4
Sulphate of Ammonia, cwts./acre	1½	11½	12½	11
	3	14½	13	12½
	6	14	15	14

Yields relative to lowest rate of Muriate of Potash and Sulphate of Ammonia as 100.

		Muriate of Potash, cwts./acre.		
		1	2	4
Sulphate of Ammonia, cwts./acre	1½	100	109	96
	3	126	113	109
	6	122	130	122



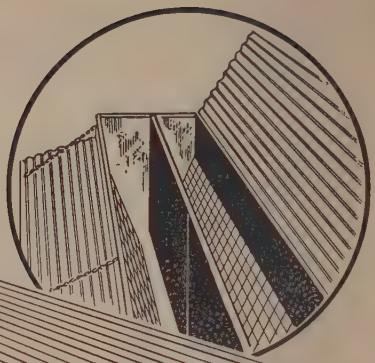
KEEP YOUR JOURNALS

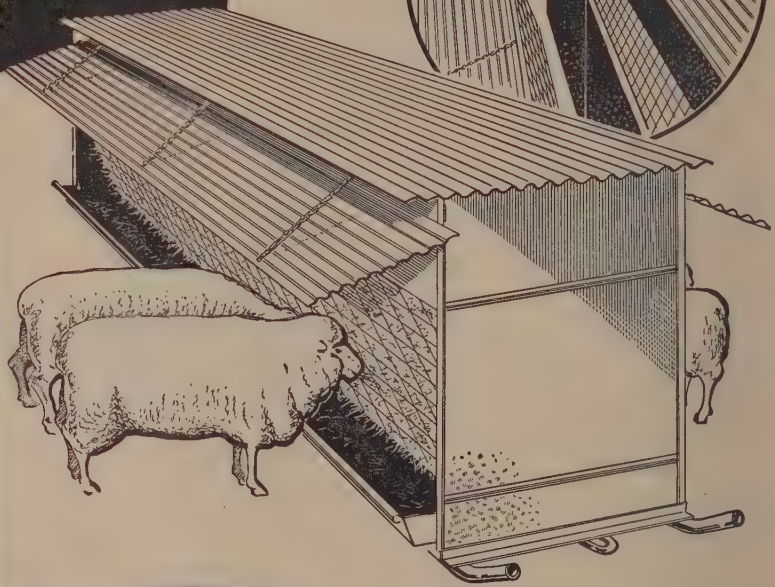
HERE at the production end, we are sparing neither expense nor effort in making the "Journal of Agriculture" a publication which will help you in your farming operations.

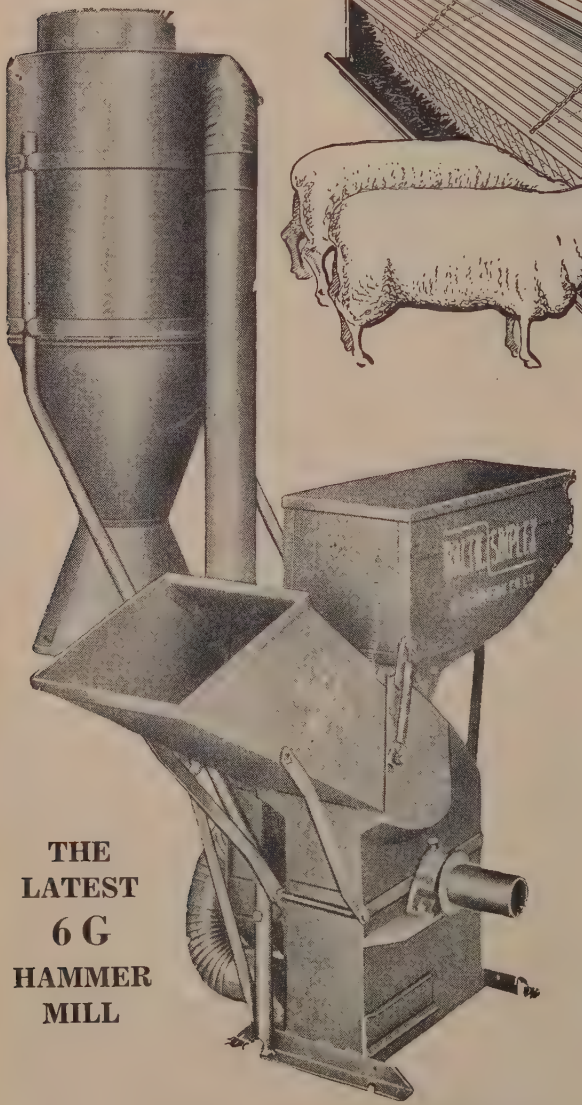
We suggest that the Journal is worth keeping and that a year's issue will make an attractive and useful volume for your library—a volume that is full of sound factual information, attractively presented.

Arrangements have been made for the compilation of a comprehensive index to be incorporated in the December issue—a feature which will greatly enhance the value of the Journal as a work of reference.

THE NEW NON CLOG SHEEP FEEDER







THE LATEST 6 G HAMMER MILL

WRIGHTS HAM-O-FEEDER

At a recent Annual Field Day in Orange, N.S.W. (attendance 15,000), an Award of Merit was given to the Perry Patent Hammered Chaff Feeder. The Award read: "For efficiency feeding hammered chaff without 'bridging'."

Satisfactorily handles hammer mill chaff without clogging or binding. Galvanised throughout, will hold 20 wheat bags of food—will feed 20 sheep at a time and the patented swinging panels prevent feed from becoming compacted. Can also handle wet as well as dry chaff.

Unit mounted on skids with a tow bar for easy moving.

Write for literature for this and other feeders.

6 G HAMMER MILL WITH EXTRA LARGE HOPPER

The 6 G is a specialised machine of high capacity with wide mouth. Note the extra large hopper which takes one full bag of grain. Treats baled hay with output ranges from 3,000 to 4,500 lb. per hour.

Inquire also regarding T.R. 4 G and 5 G Hammer Mills.

WRIGHTS LIMITED

Phones BA7178
609-11 WELLINGTON ST. PERTH

PULLORUM-TESTED POULTRY FLOCKS

PULLORUM disease has now been almost eliminated from breeding and hatchery poultry flocks in Western Australia by the annual blood-testing of all birds and the destruction of reactors. Only 305 reactors were found in a total of 135,990 birds tested this season—an incidence of infection of 0.22 per cent.

Adult hens which appear to be perfectly healthy may be carriers of the pullorum germ and may lay a proportion of infected eggs. Chicks hatched from such eggs can spread the infection throughout the incubator and cause many deaths among young chicks during the first few days after hatching.

A rapid and simple method of blood-testing has been evolved to aid in the detection of carriers, and most leading hatcherymen voluntarily submitted their flocks to this test, leading to a marked reduction in the incidence of the disease.

Early in 1955, an amendment to the Stock Diseases Act made blood-testing compulsory for all commercial breeding and hatchery flocks, and it was required that the incidence of infection as determined by the last test prior to the commencement of hatching must be less than 2 per cent.

Details of the tests from 1948 to 1957 are given in the accompanying table.

Year.	Birds Tested, including Retests.	Reactors.	Percentage.	Case of Pullorum diagnosed at Laboratory.
1948	51,953	2,821	5·43	51
1949	49,901	2,839	5·65	62
1950	66,062	3,956	5·95	34
1951	81,216	2,737	3·37	23
1952	100,000	2,535	2·53	6
1953	108,452	1,474	1·36	2
1954	118,776	922	0·77	
1955	119,304	418	0·35	
1956	128,401	1,042	0·81	
1957	135,990	305	·22	None to 21st June, 1957

TESTED FLOCKS

In the following list of 70 flocks tested during the current season it will be seen that in every case the incidence of infection is well below 2 per cent. Over one-third of the flocks tested showed no reactors and the majority had considerably less than 1 per cent.

The breeds of poultry in the flocks are indicated by the following abbreviations:—

White Leghorn WL; Australorp A; Rhode Island Red RIR; First Cross XB.

Name and Address.	Breed.	No. of Birds Tested.	Percentage Reactors at Last Test.
Adams, W. T.—Bullsbrook	WL	787	0·2
Anderson, P.—King Edward Rd., Osborne Park	A, XB	1,923	0·52
Angle, L.—Mt. Helena	A	529	0·0
Barker, G.—Widgee Rd., Morley Park	A, WL, XB	4,978	0·16
Barnett, T.—Cowaramup	A	388	0·0
Bell, C. J.—Grand Promenade, Morley Park	A	2,199	0·32
Bell, N. A.—Abernethy Rd, Cloverdale	A, WL, RIR	4,782	0·3
Carter, R. J. & N. H.—Eva St., Maddington	WL	787	0·2
Carter & Blakey—King Edward Rd., Osborne Park	A, XB	3,372	0·73
Chadwick, F.—Narrogin	A, WL	1,895	0·16
Charlton, A.—Kenwick	A	2,082	0·14
Challis, D.—7th Rd., Armadale	A, WL	2,597	0·0
Chalmers, H. P.—Riverton	WL	2,515	0·39
Coci, G.—Albert St., Osborne Park	A, WL	488	0·0
Cole, H.—Division St., Welshpool	A, WL	1,640	0·0
Collie, E.—Hamilton Rd., Hamilton Hill	A, XB	824	0·24
Cook, W. A.—Welshpool Rd., Welshpool	A, WL	2,893	0·10
Conlon T.—Troy St., Bassendean	A, WL	269	0·0
Dabelstien—Ypres Rd., Kelmscott	A	1,940	0·31

Name and Address.	Breed.	No. of Birds Tested.	Percentage Reactors at Last Test.
Dadley H.—Rockingham Rd., South Coogee	WL	1,437	0·62
Davey & Sons, G.—11th Rd. Armadale	A, WL, RIR	9,182	0·40
Doyle, A.—Beechboro Rd., Beechboro	A	2,700	0·15
Ege, E.—Beach Rd., Kwinana	A	248	0·4
Fawkes, A.—Wyatt Rd., Bayswater	A	2,628	0·45
Fenton, J.—North Lake Rd., Melville	A, WL, RIR	3,024	0·49
Ford, J.—Belmont Ave., Cloverdale	A, WL, XB	1,786	0·1
Freeth, J	A, WL, RIR	1,951	0·0
Gardiner, C.—Division St., Welshpool	A, WL, RIR	2,668	0·19
Gates, A. S.—King Edward Rd., Osborne Park	A, XB	2,230	0·54
Greay, T. S.—Division St., Welshpool	A, XB	2,340	0·17
Hadlow, E.—Mt. Helena	A	1,609	0·0
Hampton, A. Scott St., Kewdale	A, WL, RIR	9,877	0·16
Hall, W. G.—South St., Melville	A	2,121	0·23
Hedges, J.—President St., Kewdale	A, WL	1,693	0·18
Heggie, L.—Wanneroo Rd., Wanneroo	A	1,530	0·26
Hill, R.—Widgee Rd., Morley Park	A, WL	2,894	0·0
Hopkinson, A. I.—Vale Rd., Bushmead	A	1,465	0·13
Hunter Bros.—Kewdale	A	1,097	0·1
Keene, K.—Great Eastern Highway, Redcliffe	A	50	0·0
Lane, H. A.—Kent Rd., Wanneroo	MIXED BREEDS	183	1·09
Leonard, H.—Johnston St., Mt. Helena	A, WL, RIR	2,050	0·39
Martin, V.—Station St., Gosnells	A, WL, XB	997	0·1
Miles, R.—Wanneroo Rd., Wanneroo	A	443	0·45
McAuliffe, H.—Katanning	A	550	0·0
McGregor, E. M.—Uranium St., Kewdale	A	1,750	0·0
McIntyre, B.	A, WL, RIR	820	0·2
Oberholzer, H.—Albert St., Tuart Hill	A, WL	383	0·0
Oliver, R. E.—Welshpool Rd., Welshpool	A, WL	1,895	0·0
Parin, A.—11 Mile, Wanneroo	A	1,397	0·0
Pentland, R.—9 Mile, Wanneroo	RIR	264	1·52
Potter, R. S.—Katanning	A, XB	812	0·0
Porter, L.S.—Narrogin	A, WL, RIR	2,128	0·0
Preston, J.—West Swan Rd., West Swan	A	140	0·0
Price, E. E.—Macedonia St., Naval Base	WL	1,011	0·0
Pymn, G.—Wanneroo Rd., Wanneroo	A, WL	1,891	0·26
Reid, J.—President St., Kewdale	A, XB	1,347	0·22
Roberts, S. G.—Cohn St., Carlisle	A, WL	2,767	0·65
Sears, G.—Wanneroo Rd., Wanneroo	A	1,884	0·26
Smolenski, W.—Oats St., Kewdale	A	1,296	0·0
Stevens, J.—Swan St., East Guildford	A, WL, RIR	1,004	0·2
Straw, F. & D. M.—Adelaide St., Maida Vale	A	1,447	0·0
Tyler, A.—Beechboro Rd., Beechboro	A,XB	1,698	0·08
Upson & Son—Pemberton	A, WL,	1,871	0·0
Wear, A.—Kew St., Kewdale	A, WL	447	0·0
Wilshusen, T.—Wharf St., Queens Park	A, WL	1,257	0·0
Wilson, H.—Kooyong Rd., Kewdale	A	992	0·0
Whittaker, C.—Yale Rd., Kenwick	A, WL	4,428	0·27
Woodard, L.—George St., Queens Park	A, WL, XB	2,156	0·14
Woodard, H.—Hughes St., Canning Vale	A, WL	2,188	0·09
Yates, A.—Fulham St., Cloverdale	A, WL	2,347	0·0

A SHEEP-DIPPING PROBLEM

Dieldrin and aldrin sheep dips have largely supplanted the arsenical dips formerly in common use, as they are undoubtedly effective against lice and keds and, in addition, protect the sheep against blowfly strike for periods of up to three months.

Nevertheless, the widespread use of dieldrin and aldrin dips is creating an increasingly serious problem in itch mite control.

During the past 12 months there has been a sharp rise in the incidence of itch mite infestation in this State and many cases have been reported both from sheep markets and individual properties.

It would appear that itch mite infestation has always been much more prevalent that was generally supposed, but it has been kept in check by the use of arsenical dips.

Arsenical dips are not the complete answer to itch mite control—lime sulphur dips are the only known method of obtaining complete eradication—but it would appear that both arsenicals and some dips containing rotenone will reduce the mite population to a level where they fail to produce any obvious ill-effects.

Aldrin and dieldrin have no effect upon the itch mites however and, as a result, the parasites are making their presence felt in many flocks.

In approaching the problem, we must consider not only the flocks now showing signs of infestation, but also the many flocks which are harbouring the mites but are not yet obviously infested. The itch mite is slow and insidious in its spread and may be present in a flock for some years before a significant proportion of the sheep are affected.

It is unlikely that lime-sulphur dipping will become routine practice as the material is costly, highly irritant and must be used with care. Even the incorporation of dieldrin or aldrin into lime-sulphur dips would not overcome these obvious disadvantages and such treatment is only likely to be employed on badly itch-mite infested flocks.

A return to arsenical dipping with jetting against blowflies as a separate operation, using dieldrin or aldrin might be regarded as a retrograde step, but appears to be the only practical solution at the present time.

An insecticide which will destroy itch mite, lice, keds, and afford a reasonable degree of protection against blowfly strike is obviously required and must continue to be sought.

ARE YOU ON OUR MAILING LIST?

"The Journal of Agriculture of Western Australia" is posted free of charge to bona fide farmers in this State. If you are not receiving the Journal write to, The Editor, "Journal of Agriculture", Department of Agriculture, Perth, giving your name and address (block letters please) together with your location number.

Non-farmers, or farmers not resident in Western Australia may receive the Journal (six issues at two monthly intervals) sent post free on payment of an annual subscription of 10s.

VIBRIOSIS

A SERIOUS OBSTACLE TO THE BREEDING EFFICIENCY OF CATTLE

By P. M. A. HARWOOD, M.R.C.V.S., Senior Veterinary Officer

THE infection of cattle by the organism Vibrio foetus has been recognised for about 50 years as a cause of abortions. It is only in the past decade, however, that the importance of the disease as a cause of infertility and sterility has been appreciated. This disease, vibriosis, is extremely widespread in the South-West of Western Australia, and is undoubtedly the greatest single obstacle to an ordered breeding programme by which cattle raisers are confronted.

Vibriosis is due to infection with the organism *Vibrio foetus*. This germ lives only in the genital tract of cattle, affecting both males and females. It is difficult to recover from infected animals and hard to grow in the laboratory.

TRANSMISSION

Vibriosis is spread by contact when a cow is served by an infected bull, or when the semen of an infected bull is used for A.I. In the A.I. scheme in W.A. all bulls are proved free of vibriosis before use and the semen is treated with antibiotic. As some authorities have reported cases in unmated heifers, it would appear that the disease can be spread by other means, but for practical purposes, it can be considered that the only ways cows are likely to become infected is a result of being served by infected bulls.

VIBRIOSIS IN BULLS

Bulls show no outward evidence of infection. Sexual desire is not decreased. However in time the quality of the semen degenerates and diseased bulls may eventually become sterile. Bulls do not recover, once they have become infected.

VIBRIOSIS IN COWS

A number of symptoms are exhibited by diseased cows. All these symptoms have been observed in W.A.

(a) Infertility.

The most frequent symptom of vibriosis in a dairy herd is that a large number of cows fail to settle to service. If breeding records are kept the following conditions will be found to exist.

(i) *Irregularity in the Heat Periods.*—The normal interval between heat periods is upset. Intervals of 25-30 days are common.

(ii) *Failure of Cows to Come in Heat after Calving.*

(iii) *Return to Heat after Cows have Apparently been Settled.*—A large percentage of the cattle in an infected herd appear to settle, only to show heat after 2-4 months. In many cases this is due to an early undetected abortion taking place.

(iv) *Permanent Sterility.*—Although the majority of cows will eventually build up a tolerance to vibriosis and after having shown some of the symptoms outlined in (i), (ii) and (iii) will regain breeding efficiency, a percentage will become totally sterile.

(b) Abortions.

Apart from the early abortions which frequently occur at the onset of an attack of vibriosis in a herd, a percentage of cows in some herds (4 to 30 per cent.) will abort in the seventh or eighth month.

(c) Birth of Dead or Weak Calves.

(d) Retention of Afterbirth.

(e) Vaginitis.

A frequent symptom of vibriosis is associated with vaginitis occurring shortly after service by an infected bull. A yellowish or soapy mucous discharge is seen three to four days after mating.

DIAGNOSIS

Vibriosis may be suspected when any of the above symptoms appear in a herd. It

may be confirmed from the direct examination of a fresh aborted calf, or by the Mucus agglutination test. One positive diagnosis of vibriosis in a cow is evidence that the herd is infected.

COURSE OF THE DISEASE

When vibriosis enters a herd, a large percentage of the cows will return to service. Some cows, provided they have acquired a previous resistance, will conceive and calve normally; others will conceive normally only to abort late in pregnancy or give birth to dead or weak calves. These normal conceptions may be very infrequent at the onset of the disease.

On a herd basis, the typical picture of early vibriosis is that the major part of the herd fail to conceive and show the irregular returns to service referred to earlier. As many cows appear to settle, only to return after three or four months, then take three or four services before eventually conceiving, the period of infertility in these cows may last six to eight months. Cows which are not affected by early abortion or foetal resorption and which show only symptoms of infertility will often conceive after three to five services and therefore return to breeding efficiency more rapidly.

In a normal outbreak it would be reasonable to expect about 50 per cent. of the herd to conceive after five months with about 75 per cent. settling after nine months.

At the end of a year, the majority of cows have built up a tolerance to vibriosis, by symptoms continue to appear as heifers and susceptible bought-in cows are exposed to infection on being introduced into the herd.

So long as natural service is used, the bulls will perpetuate the disease which will continue to appear for years among susceptible cows. In whole-milk producing herds where the turnover of cattle is high, particularly where cows are being culled for fertility and replaced, vibriosis can be of serious economic consequence year after year. After the initial outbreak in self-contained herds, the disease exists more as an infertility problem in heifers.

CONTROL

(1) Treatment.

Infected cows may be treated by irrigating the womb with 1 gram of streptomycin plus 300,000 units of penicillin in 20 ccs. of distilled water. This treatment is carried out during heat. If mating or insemination at the same heat is required, the treatment should be carried out 45 minutes after service. No practical method of treating bulls is recommended.

(2) Artificial Insemination.

A.I is a valuable weapon with which to combat vibriosis. In severely affected herds, it is unreasonable to expect a return to complete breeding efficiency in all cows inside 12 months as a result of A.I. alone.

PREVENTION

Vibriosis enters a herd with an infected bull or cow. The following measures are recommended:—

(1) If your cows are clean, restrict the use of all bulls on the property to your own herd.

(2) Secure fencing will keep out stray bulls which may introduce the disease.

(3) When buying bulls, buy only young unused bulls or those which are known to be free of disease.

(4) Use extreme caution when introducing cows.

(5) Artificial insemination reduces the risk of disease spreading through your herd, particularly where cows of unknown origins are bought.

SUMMARY

(1) Vibriosis is a serious menace to milk producers in particular and cattle raisers in general. Once the disease gains entry into a herd, breeding efficiency is often impaired for several years and programmes are consequently upset.

(2) The disease is usually spread by the service of a diseased bull and results in infertility, abortions sterility and retained afterbirth.

(3) Take precautions to keep the disease out by buying only young unused bulls.

(4) Artificial insemination reduces the risk of the disease spreading.

LIBRARY SERVICE OF W.A.

BOOKS... *for FARMERS*

THE following books on agriculture, recently published and obtainable to order from most booksellers, have been added to the stock of the Library Board of W.A., and may be borrowed freely from any public library associated with the Board, or consulted at the State Library of Western Australia.

GENERAL

AGRICULTURE AND INDUSTRY RELATIVE INCOME, by J. R. Bellerby. Lond., 1956.

THE CHEMISTRY AND MODE OF ACTION OF PLANT GROWTH SUBSTANCES. Conference on Plant Growth Substances, Wye College, England. 1955. Lond., 1956.

GERANIUMS AND PELARGONIUMS IN AUSTRALIA, by F. E. Mermet. Gundarene (N.S.W.), 1955.

GROWING MUSHROOMS, by R. Genders. 3rd Ed. Lond., 1956.

MARKETING OF FRUIT AND VEGETABLES IN EUROPE. Organisation for European Economic Co-operation. European Productivity Agency. Paris, 1956.

AGRICULTURAL MACHINERY

YEAR BOOK, 1955/56. Institution of British Agricultural Engineers. Brighton (Sussex), 1955.

FIELD CROPS

CORN AND ITS EARLY FATHERS, by H. A. Wallace and W. L. Brown. [East Lansing]), 1956.

FORAGE CROPS, by G. H. Ahlgren. 2nd Ed. N.Y., 1956.

MODERN COFFEE PRODUCTION, by A. E. Haarer. Lond., 1956.

SOILS AND FERTILISERS

THE AGRICULTURAL VALUE OF PHOSPHATE FERTILISERS WHICH ECONOMISE IN THE USE OF SULPHURIC ACID: REPORT ON A STUDY, by G. W. Cooke. Paris, 1956.

SOIL CONSERVATION, by S. G. Archer. Norman (Okla.), 1956.

SOIL STERILIZATION, by W. J. C. Lawrence. Lond., 1956.

DISEASES AND PESTS

BIOLOGY OF ROOT-INFECTING FUNGI, by S. D. Garrett. Cambridge, 1956.

GALL MIDGES OF ECONOMIC IMPORTANCE, by H. F. Barnes. Lond., 1946.

THE GARDENER'S BUG BOOK, by C. Westcott. New Ed., Rev. N.Y., 1956.

INSECT PESTS OF FARM, GARDEN AND ORCHARD, by L. M. Peairs and R. H. Davidson. N.Y./Lond., 1956. 5th Ed.

FRUIT GROWING

GOOD FRUIT FARMING, by C. R. Thompson. Lond., 1949.

MODERN COMMERCIAL FRUIT GROWING, by T. Wallace and R. G. W. Bush, Eds. Lond., 1956.

FORESTRY

GENETICS IN SILVICULTURE, by C. S. Larsen. Edin., 1956.

SILVICULTURE, by J. Kostler. Edin., 1956.

LIVESTOCK

APPLIED ANIMAL NUTRITION: THE USE OF FEEDSTUFFS IN THE FORMULATION OF LIVESTOCK RATIONS, by E. W. Crampton. San Francisco (Calif.), 1956.

CATTLE OF BRITAIN. Ministry of Agriculture, Fisheries and Food, Great Britain. Lond., 1955.

FEEDING FARM ANIMALS IN AUSTRALIA, by A. C. T. Hewitt. Syd., 1953.

GOOD PIG-KEEPING, by N. L. Tinley. Lond., 1947.

GOOD SHEEP FARMING, by N. L. Tinley. Lond., 1949.

PIG RAISING ILLUSTRATED. Department of Agriculture, Victoria. Melb., [1954].

THE RANGE AND PASTURE BOOK, by R. L. Donahue and Others. (N.J.), 1956.

RANGE MANAGEMENT: PRINCIPLES AND PRACTICES, by A. W. Sampson. N.Y./Lond., 1952.

POULTRY

MODERN POULTRY FARMING, by L. M. Hurd. 4th Ed. N.Y., 1956.

POULTRY BREEDING MANAGEMENT, by J. Amsden and K. W. Brandon. Lond., 1956.

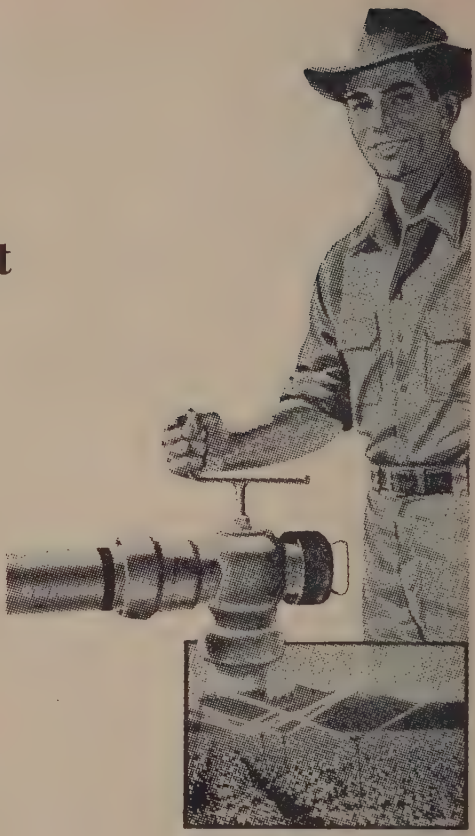
DAIRYING

THE CLEANSING OF MODERN DAIRY PLANT. J. Crosfield & Sons, Ltd. Warrington, England. 2nd Ed. Warrington (Lancs.), 1956.

MILK AND BUTTERFAT RECORDING: A WORLD SURVEY, by E. D. Ashton. Farnham Royal (Bucks.), 1956.

AMES

The World's Leaders in Irrigation Equipment MAKE EVERYTHING for the man who needs a MODERN IRRIGATION SYSTEM



ROTO-RAIN
PERF-O-RAIN
LO-HEAD GATED PIPE
TOW-A-LINE
WHEEL-O-RAIN

FREE PLANNING SERVICE

by

Sandovers

IRRIGATION ENGINEERS

Fellow of the Water Research Foundation of Australia

Spring Sown Oats for Hay

VARIETY TRIALS AT THE DENMARK RESEARCH STATION

BY

F. E. RYAN, AGROSTOLOGIST

V. WESTON, MANAGER DENMARK RESEARCH STATION

A. S. JAMES, TECHNICIAN

THE practice of ploughing paddocks in late winter or early spring and the sowing of oats in August and September to cut for hay in November has many advantages in the higher rainfall areas in the south of the State. Trials conducted at the Denmark Research Station from 1954 onward indicate that Fulghum, Kent and Avon oats are the most suitable varieties for spring planting in that district.

The advantages referred to may be briefly listed as follows:—

(1) Spring sowing helps to relieve the pressure of work in the autumn.

(2) Paddocks which are ploughed in autumn frequently become too wet to graze during the winter months, but if left unploughed until spring they are available for grazing during the autumn and winter when pasture growth is short, and are taken out of the grazing area at a time when there is usually adequate pasture growth on the remainder of the farm.

(3) Control of annual weeds which germinate in the autumn can be achieved by late winter or spring ploughing if this is done before the weeds flower.

(4) The area on which the spring-sown oats are grown is available for re-sowing with pasture species early next autumn, that is after a brief cropping period.

(5) Because the main cultivation is carried out in the year preceding the sowing down of new pasture, the seed bed is given a chance to consolidate and the newly-sown pastures are less likely to become waterlogged during the autumn and winter.

(6) The spring-sown oats are usually cut for hay after the meadow hay has been cut, thus spreading the work in late spring and early summer. This extended hay-cutting period permits larger areas to be cut for hay.

VARIETIES TESTED

Early or mid-season oat varieties appeared to be most suitable for the trials and the following were included:—Fulghum, Ballidu, Orient, Wongan, Avon, W.32 and Kent.

Each variety was cut for hay when the grain had reached the milky stage. All varieties tended to reach this stage at approximately the same time with only about a week between the earliest and latest varieties. The sowing and cutting dates for the three years are shown in Table 1.

TABLE 1—TIMES OF SOWING AND CUTTING.

Variety.	1954.		1955.		1956.	
	Sown.	Cut for Hay.	Sown.	Cut for Hay.	Sown.	Cut for Hay.
Fulghum	Aug. 24	Nov. 25	Aug. 16	Nov. 25	Aug. 16	Nov. 23
Ballidu	Aug. 24	Nov. 25	Aug. 16	Nov. 25	Aug. 16	Nov. 23
Orient	Aug. 24	Nov. 29	Aug. 16	Dec. 1	Aug. 16	Nov. 23
Wongan	Aug. 24	Nov. 22	Aug. 16	Nov. 25	Aug. 16	Nov. 19
Avon	Aug. 24	Nov. 29	Aug. 16	Nov. 25	Aug. 16	Nov. 22
W.32	Aug. 24	Nov. 25	Aug. 16	Nov. 28	....	....
Kent	....	....	Aug. 16	Nov. 25	Aug. 16	Nov. 22

1954 TRIAL

After seeding on August 24, 1954, an unusually hot period with below average rainfall occurred until October 28. Good falls of rain were recorded on October 28 and during November. The oat plants which had lacked vigour before this rain, then grew vigorously during the last four weeks and cutting was completed by November 29. Yields of hay are shown in Table 2.

TABLE 2—1954.

Variety.	Cutting Date (Milky Stage).	Air Dry Yields.	
		Cwts. per Acre.	Percentage of Fulghum (Control).
Fulghum	Nov. 25	46·0	100
W.32	Nov. 25	43·9	95
Avon (W.29)	Nov. 29	42·5	92
Ballidu	Nov. 25	27·5	60
Wongan	Nov. 22	25·4	55
Orient	Nov. 29	24·3	53

Three varieties, Fulghum, W.32 and Avon were outstanding in this trial and were much superior to Ballidu, Wongan and Orient.

1955 TRIAL

The sowing this year was on August 16, under wet conditions which continued throughout the trial—a total of 15½in. of rain being recorded between sowing and cutting for hay. Plants generally lacked vigour and tillering was poor. The yields were below average and are shown in Table 3.

TABLE 3—1955

Variety.	Cutting Date (Milky Stage).	Air Dry Yields.	
		Cwts. per Acre.	Percentage of Fulghum (Control).
Avon	Nov. 25	18·2	144
Ballidu	Nov. 25	14·5	114
Kent (W. 30)	Nov. 25	14·3	112
W. 32	Nov. 25	14·3	112
Fulghum	Nov. 25	12·7	100
Wongan	Nov. 25	11·3	89
Orient	Nov. 25	8·7	68

All varieties were cut on November 25, 1955. Yields were low and the differences between varieties were not statistically significant. As might be expected under such wet conditions, the plots were very variable.

1956 TRIAL

After sowing was completed in August 16, favourable growing conditions were experienced. A total of 971 points of rain fell during the growing period and yields of hay were satisfactory as indicated in Table 4.

TABLE 4—1956.

Variety.	Cutting Date (Milky Stage).	Air Dry Yields.	
		Cwts. per Acre.	Percentage of Fulghum (Control).
Kent	Nov. 22	41·5	108
Fulghum	Nov. 23	38·3	100
Avon	Nov. 22	36·1	94
Ballidu	Nov. 23	25·7	67
Wongan	Nov. 19	24·7	65
Orient	Nov. 23	21·8	57

The three varieties, Kent, Fulghum and Avon were outstanding in this trial, yields from Ballidu, Wongan and Avon being poor by comparison.

DISCUSSION

Fulghum, Kent and Avon are clearly superior to Wongan, Ballidu and Orient for spring sowing and can be recommended for the Denmark district. W.32, although it yielded well in the 1954 trial was discarded by the plant-breeders as it failed to measure up to the required standards in most of the cereal-growing areas of the State and was replaced by Kent in the 1956 trials.

The fact that the best of the varieties yielded almost twice as much hay as the poorest variety tested, emphasises the importance of purchasing seed oats of a named variety. Unfortunately, many farmers merely ask for "seed oats" or even use a line of feed oats for sowing for hay.

Yields, in general, were good throughout the trials. Water-logged conditions prevented maximum growth in 1955, but in the other two years, air-dried yields of over 2 tons to the acre were obtained from the best varieties and the average yield for all varieties was over 33 cwts. per acre. This yield was obtained during the three and a half months from mid-August to November when pasture growth is normally at its maximum and when the farmer can most easily make land available for hay production.

SENSATIONAL APPLE YIELDS

Is this an Australian Record ?

BY

J. S. BLOOMFIELD,

SENIOR PACKING INSTRUCTOR

Fig. 1.—This tree yielded over 30 packed cases of Granny Smiths annually for five successive years. Its best yield was 37.34 cases in 1953

MESSRS. A. J. PREECE & SONS of Keysbrook, are the proud owners of an apple orchard which has maintained some amazing production figures for many years. This year's yield of 5,609 packed cases from 347 trees is still 264 cases less than the record yield in 1953, when the trees were 17 years old.

The orchard was planted 21 years ago with trees from New South Wales. Fifty of the trees are of the Yates variety and the balance are Granny Smiths. They were planted 23ft. apart on what was formerly a peat swamp and has drains in each land.

The orchard is not irrigated but the soil remains damp all the year round and the tall lightly-pruned trees provide shade for most of the ground surface. The many heavily-burdened leaders require about 20 props per tree to support them, so that prior to picking, each row appears as a forest of props.

Throughout this article, the term "cases" refers to packed one-bushel dump cases of marketable fruit of "Fancy" or "Good" grades. There is no doubt as to the authenticity of the figures which are vouched for by officers of the Horticultural Division of the Department of Agriculture who visit the orchard frequently.

OUTSTANDING YIELDS

Since 1951, the 347 trees have yielded a grand total of 33,368 cases, the annual yields being as follows:—

	Cases.
1951	5,127
1952	4,409
1953	5,873
1954	4,691
1955	3,967
1956	3,692
1957	5,609
Total	33,368

Fig. 2.—A forest of props—about 20 per tree—support the heavily-burdened branches as picking time approaches.

The 50 Yates trees yielded an average of 1,000 cases a year or 20 cases per tree for the four seasons, 1953 to 1956, inclusive. In the current season, the Yates failed to reach that figure, but the yield from the Granny Smiths would be similar to that of the record season (1953) when the average for the whole orchard was just under 17 cases per tree.

The highest yielding tree in the orchard —a Granny Smith on the end of a row— gave over 30 cases a year in five successive years, 1953 to 1957, including yields of 37.34 cases in 1953 and 36 cases in 1957.

THE CURRENT SEASON

This year, picking was commenced on March 10, to relieve over-laden branches. Most of the fruit was 2½in. with 2¼in. and 2¾in. in about equal proportions.

When the main picking commenced on March 24, the sizes were 2½in. to 2¾in. with a few 3in. fruits.

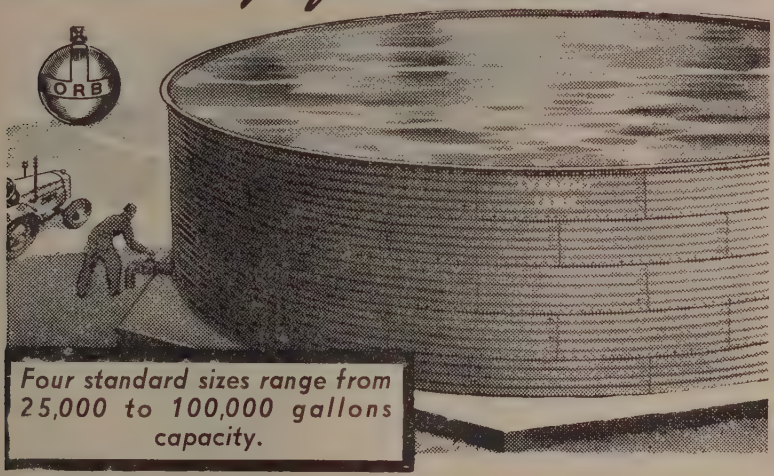
A month later, when completing the picking, more than half the fruit was in the 2¾in. to 3in. range—an excellent illustration of the development of the fruit and the advantages of picking to size.

Water is essential

CONSERVE ALL YOU CAN IN A HEAVY GAUGE

LYSAGHT

prefabricated water tank



Four standard sizes range from 25,000 to 100,000 gallons capacity.

MATERIAL: Heavy Gauge 5/5" corrugated galvanized sheets, pre-drilled and curved. Waterproof jointing material: Bolts, nuts, washers and tools. Outlet fitting, drilled and threaded to suit every pipe size up to 6". Bolted construction facilitates replacement of sheets without dismantling.

Lysaght Tanks are designed to be erected on concrete bases (provided by the purchaser). Details of recommended bases, using the cement penetrant method of construction, are available on request. Special materials for cement penetrated concrete base are available as optional extras. Cement, sand and aggregate are provided by the purchaser.

USES:

- Water conservation
- Irrigation head tank
- Industrial water storage
- Swimming pools
- Town water supply
- Fire fighting

Overflow unit available at slight extra cost

PRICES F.O.R. NEWCASTLE

Nominal Capacity	Diameter	Height	Weight	Price
25,000 gallons	23ft. 10in.	10ft. 4in.	1¾ tons	£329
50,000 gallons	33ft. 5in.	10ft. 4in.	2½ tons	£460
75,000 gallons	40ft. 7in.	10ft. 4in.	2¾ tons	£577
100,000 gallons	45ft. 9in.	10ft. 4in.	3¼ tons	£656

Prices c.i.f. capital cities available on application

10,000-Gallon Water Tanks (tall or squat) are available also

10,000-GALLON WATER TANK PRICES EX FREMANTLE STORE

14ft. 4in. dia., 10ft. 7in. high — Basic unit, £135

19ft. 1in. dia., 6ft. 5in. high — Basic unit, £102

DISTRIBUTED IN WESTERN AUSTRALIA BY:—

Dalgety & Co. Ltd., Perth
Elder Smith & Co. Ltd., Perth
Goldsbrough, Mort & Co. Ltd., Perth
Katanning Stock & Trading Co. Ltd., Katanning
Harris, Scarfe & Sandovers Ltd., Perth
McLean Bros. & Rigg Ltd., Perth
R. A. Reilly & Co., Narrogin
Westralian Farmers' Co-operative Ltd., Perth

Write for further information to:

JOHN LYSAGHT (AUSTRALIA) PTY. LTD.—FREMANTLE, or

LYSAGHT'S WORKS PTY. LIMITED, NEWCASTLE WORKS, N.S.W.

LC13XW

There's MONEY in every bag!

When you buy

APEX

Fertilisers and Mashes

from

W.A. PRODUCE CO.

113 Oxford St.,
Leederville
W 3354 W 1680

6 Gt. Northern Hwy.,
Midland Junction
UJ 1215

347 Charles St.,
North Perth
BJ 2175

FODDER CONSERVATION BRINGS BIGGER CREAM CHEQUES

By J. A. CARBERRY,
B.Sc. (Agric.),
Agricultural Adviser

CONSERVATION of plenty of fodder is undoubtedly one of the most important operations on the dairy farm. Conservation is the master key which, when turned to the full will help in attaining very good butterfat production, providing, of course, that breeding and "weeding" are being carried on wisely and that no serious diseases are encountered.

The growth of an average pasture in the Denmark district is shown on the accompanying graph.

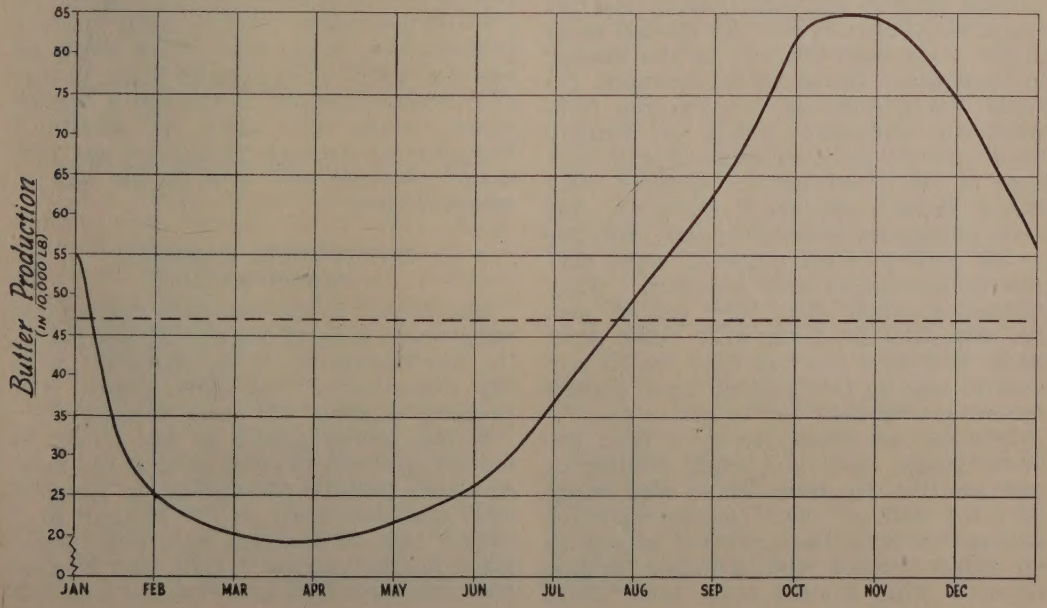
The dotted line is drawn to represent the level of feeding at which cows should be fed to produce, say an average of 350 lb. of butterfat.

THE GRAZING HABITS OF COWS

Observations carried out to obtain information on how the cow spends her time, resulted in the conclusion that no matter how good or how poor the pasture is from a feed point of view, a maximum of only eight hours each day are spent in grazing. Thus, it is futile to graze stock over a big acreage of pasture when the feed is short in the belief that by having a large acreage to "go at" the cows will feed well and produce well. No matter whether the pasture be long or short, poor, medium or good, a cow will graze for only eight hours a day.

Production per day from a cow depends on feed per day for the cow. When the pasture is short the cheapest and most economical way of increasing the quantity of cream going into the cream cans, and eventually the money going into the bank book, is to feed sufficient conserved fodder.

In the Denmark district the biggest cream cheques of the year are usually in the months of October and November. The pasture growth curve shows that this



is the time of year when pastures are making the so-called "spring flush," when the feed is "growing away" from the cows. These few short weeks make up the one and only period of the year when cows in their "work day" of eight hours grazing can consume sufficient pasture to enable them to produce to their capacity. It can be speculated whether the bigger the "flush" in spring the shorter the farmer has been of silage, and hay. In other words, the more outstanding the October and November cream cheques are compared to the other months of the year, the more likely it is that there has been a shortage of conserved fodder to supplement the pasture.

NUMBER OF MOWING PADDOCKS

It is a regrettable fact that the number of mowing paddocks in the "big timber" areas, such as Walpole, Nornalup, Kent River and Denmark is not high enough to carry out a full conservation programme.

On farms with only a few mowing paddocks which have been cut for hay year after year, almost invariably acute symptoms of potash deficiency can be seen or have had to be rectified previously to avoid wasting the super which has been applied and to make it worth while cutting the paddock for hay.

Many farmers, because of this and other reasons, take up additional blocks and run bigger herds of cows over say 250-300 acres in the hope that this will be the answer to their quest for increased financial returns. A number of farmers who have tried this extensive system of farming have come to the conclusion that if they have to be farmer-timber clearers, they would rather intensively farm, say, 140 acres of pasture than try to cope with 250 or 300 acres of land, much of which carries fallen timber and bracken. They further conclude that they cannot give the attention to their stock that they would like, as it is a full-time job for one man to saw up fallen trees, mend broken fences, cut bracken and so on.

On lines not greatly removed from the above group, there is a small number of older settlers in these areas who relate that the bulk of their outside work for the last 30 years has consisted of sawing up fallen timber and mending broken fences. They further state that "there seems to be as much timber on the paddocks now as ever there was." Where the 3 tons). As hay and silage were to be cut timber is capable of being handled by a bull-dozer these farmers have already begun to get several acres pushed down each year. After this, they "can get down to some real farming by ploughing, levelling and re-seeding": in short, they want permanently to increase the number of their mowing paddocks.

Quite a number of farmer are spending excessively on concentrates. The feeding of concentrates at high levels is definitely not economic. No-one knows better than the butterfat producer that his costs of production must be kept at the barest possible minimum. The cheapest of all feeds is pasture and next cheapest are silage and hay.

It would pay these farmers to work out if it would not be cheaper in the long run to have a few acres amenable to bull-dozing completely cleared each year, then levelled and made fit for mowing to grow their own feed in the form of hay and silage rather than to spend a lot of "dead" money on concentrates. Whilst it is realised that this is not one-generation-country, an increased number of mowing paddocks means a better chance to stave off severe potash deficiency; more cheap feed in the form of silage and hay can be cut and less money need be spent on concentrates. In many cases there would be less time spent on sawing up fallen timber and mending broken fences and a farmer could "really get down to farming." Furthermore average production per cow would increase and with it the size of cream cheques.

ROTATIONAL FARMING DEMONSTRATION

One farmer in the Denmark district has undertaken to carry out a rotational farming demonstration in co-operation with the Department. The farm chosen is a property of about 120 acres of pasture.

It was jointly agreed at the outset to plough up about 10 acres or so of the most worn-out pasture (depending on paddock size) and sow down in the autumn to a fodder crop of Algerian oats and inoculated Purple Vetches. Oats and vetches were used primarily as a cleaning crop and

secondly because they can be expected to yield a good bulk hay (around 50 cwt. or on a rotational basis rather than the same old paddocks to be continually cut year after year, the area was to be made fit for mowing by removing timber and levelling. The following autumn the area was to be sown down to perennial grass and subclover; in this case perennial ryegrass and mid-season subclover were to be used.

In actual fact, 15 acres were ploughed up and the oats and vetches gave a cut of 2½ tons per acre or a total yield of approximately 37 tons. This 37 tons on top of his usual cut of hay gave him more fodder than he had ever had before. The hay barn was choc-a-bloc full and all available sheds were used, but even so, some hay had to be stored in the open. His intention now is to build a new and bigger hay shed, and he is not in the least worried at the expense to be incurred. By feeding out this hay during the second year his cream cheques increased and frequently he was listed as having one of the leading herds in his Grade Herd Recording Unit. Financially he is better off; gross returns have increased and much more important, net profits are bigger. Moreover he has gained two extra mowing paddocks.

Having proved to his own satisfaction the value of plenty of conserved fodder, he knows he has taken a step in the right direction. He is keener than ever to continually increase the number of his mowable paddocks and from these the amount of fodder that he conserves.

ADVANTAGES OF SILAGE AND HAY

It is a virtual impossibility for cows to produce milk without water. Up to three gallons of water are needed to produce one gallon of milk in summer. In addition to plenty of water, there must also be sufficient protein-rich feed. Pastures, when they have dried out, contain next to no moisture and barely any feed value for milk production. Silage, because of its succulence and high protein content (when properly made), is one of the best and cheapest feeds for keeping the cows in profit during the hot summer months when pastures are dry and unpalatable. Obviously a cow which is in profit for 300 days is a much better proposition than one which milks for 200 days and then lives the life of ease of a non-paying guest for another 150 days.

For maximum efficiency of feed intake, it has been determined that cows should be neither constipated nor scouring but rather, that the droppings be mid-way between these two extremes. When a cow is constipated she is off-colour and does not feel like eating much to aggravate the condition. Production therefore falls. On the other hand, if she is scouring badly her digestive system is very badly out of order and the food tends to pass quickly through her, so that the value of the food intake is greatly lessened. Here again, production is lowered.

Some farmers state that watery green feed "doesn't seem to have the guts in it" for milk production. Shortage of hay to "bind" the cows to counteract the tendency to scour is probably the main reason for their indifferent production.

Hay, with its low moisture content and medium feed value, can help balance the watery, high protein feed of pasture during the autumn and winter months.

DEPARTMENTAL RECOMMENDATIONS

Properties vary so much that precise recommendations cannot be stated. However, as a general guide, it is estimated that to adequately feed a herd during the summer it is necessary to cut the equivalent of two tons of silage for every cow in the herd. As the average yield of silage per acre of pasture is approximately five tons, two acres would provide sufficient feed for five cows. It is also recommended to cut about two tons of hay per milking cow, this quantity being sufficient to meet the needs of all stock including the "followers" and bulls up to the end of July during the summer, autumn and winter.

Some farmers think that these quantities are too high but as they will agree costs of butterfat production must be kept to a minimum, one cannot afford to feed expensive concentrates. When viewed from this angle the Department's recommendations carry a great deal of weight.

The aim should be to get high average production figures from the soil on the farm from pasture and pasture by-products, in the form of silage and hay, and to make the farm as self-supporting as possible.

ALWAYS BUY Western Australian DRIED FRUITS

RAISIN CREAM BEAUTIFUL

Pastry case . . .

1 egg.
2-oz. sugar.
3-oz. shortening.
5-oz. flour.
¼ teaspoon baking powder.
Pinch salt.

Raisin cream . . .

2 eggs (yolks and whites separated).
¼ cup brown sugar.
1 tablespoon melted butter.
1 cup chopped seeded raisins.
¼ cup cream.
1 teaspoon vinegar.
Little cinnamon.
Salt to taste.

To make pastry shell: Beat 1 egg and sugar together. Cut shortening into egg mixture. Sift flour, baking powder and pinch salt and work into creamed mixture. Turn on to floured board, roll out, spread on to pie plate. Leave a little pastry to make strips across plate.

Raisin cream filling: Combine yolks of eggs with brown sugar, melted butter. Add raisins, cream, vinegar, cinnamon and salt to taste. Mix well. Beat egg whites until stiff, fold into mixture. Pour into the uncooked pie shell and lattice across with strips of pastry. Bake in a hot oven for 10 minutes, reduce heat and cook for another 15 minutes. Serve with whipped cream.